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Principal Contents:

	PAGE
Keeping Cool	107
Voltage Regulation and Revenue. By E. V. Clark	110
Horizontal Lanterns for Electric Discharge Lamps. By R. Maxted and L. J. Davies	111
The Empire Swimming Pool	113
Some Driving Forces in the Industry: Automatic Electric Co., Ltd.	115
The Measurement of Voltamperes. By G. W. Stubbings	115
Efficient Electric Cookers. By Ester Purvis	116
Furnace Temperature Control	117
Flameproof Electrical Apparatus	118
Correspondence: In the Winter Time? ; The Fuel Returns ; The Loading of A.c. Motors ; Wash-boilers ; Circuit-breakers and Fuses	119
A Static "Voltage Relay." By J. C. Costello	120
New Apparatus and Devices	121
Business and Industrial Notes	124
New Zealand's Electrical Imports	127
Electricity Supply	128
Traction and Communications	130
Contract Information	131
Notes	132
Our Personal Column	133
New Companies Registered	134
Returns of Electrical Companies	134
City Notes	135
Stocks and Shares	135
Published Specifications	137
New Work for Contractors	138

Keeping Cool

BECAUSE our climate is not subject to extremes of heat and cold, any departure from the normal makes difficulties for producers, distributors, and consumers of electricity and electrical appliances. Thus the switching on of existing heaters and the hurried installation of new ones in an exceptionally cold snap increases the peak of supply undertakings to an extent that is talked about for years afterwards.

In India, where one expects high temperatures, fans provide a principal load for the supply undertakings in many towns, but in Britain a heat wave causes a sudden demand for fans that cannot always be met immediately; to-morrow may be too late, and the conditions may not recur either in that or in the following summer. The only favouring circumstances are that electric fans are without competitors and that purchasers do not generally insist that they shall be of the latest model, as they do with cookers for instance, provided they are reasonably quiet in operation and that their prices are not too high for what are regarded (mistakenly) as apparatus for temporary use.

In order to get the most out of the fan load for our industry, its potentialities should be investigated on the scientific lines that have been adopted for developing the heating load. What do we want a fan for? The general reply would be for ventilation and "keeping cool." The two are often wrongly regarded as much the same thing, and the common view is that a fan that just churns up the air without removing the stale air is of little use. This belief is erroneous, since domestic fans (as now usually installed) do very little towards expelling into the outer air products of combustion, whether these be CO_2 from human exhalations or atmospheric contamination due to cooking, although they ought to have a very large field there—especially if properly fixed in all-electric houses without fireplaces.

Keeping cool is the resultant of a number of physiological effects. The popular fallacy that a fan somehow cools the air below that of the prevailing shade temperature dies hard. It may, accidentally, help things a little by sending air from a cooler spot, but much more important is the dispersal from the neighbourhood of the human body of the heat generated by itself, which is equivalent in the average case to that given off by a 100-W lamp, and may be actually increased by the healthily stimulating effect of fanning action on the skin. Its most valuable property is simply that it keeps the air in motion, which is even more important than changing it frequently; in still air we breathe with difficulty, and little auxiliary respiration can take place through the pores.

There is, then, every argument in favour of the continuous use of fans in living-rooms, even in seasons when the windows are closed to exclude draughts. While fans should be used to assist ventilation, they have at least as important a function, in winter as well as in summer, of giving us the great hygienic benefits of moving air.

Engineers and Their Institutions

IN connection with the celebration of the Jubilee of the American Institute of Electrical Engineers, which took place early in the present month, some comment has been made regarding problems confronting the Institute and its professional members. A New York contemporary says that, despite many temptations, the organisation has kept faith with its founders, and has gone forward as a professional society, refusing to forsake the broadway of professional electrical engineering. It is recognised, however, that improvement and change in organisation to meet new needs may be advisable, and that the most critical problem to be faced will be the demand for it to take action in non-technical matters. According to the *Electrical World*, there are those who advocate it as the duty of the American Institute to take steps to advance the economic status of individual members, and to take direct action in society and industry to bring it about, but the editor of that journal holds that such a course should not be adopted. In his opinion, the non-professional activi-

ties for all engineers, within the limits of professional ethics, should be done by the newly formed Engineers' Council for Professional Development or other joint engineering organisations. This, presumably, is a reply to the suggestions made by educational speakers during the celebrations that in the courses of study arrangements should be embodied for the better preparation of students for a business career by combining technology and economics. Readers will recall the numerous occasions upon which members have written to the ELECTRICAL REVIEW urging that greater interest be taken in their non-professional well-being by our own Institution. By its inclusion of economics and kindred matters as alternative subjects for examination, the willingness of the I.E.E. to recognise that a change has come over electrical affairs has been made obvious. One speaker held that the attitude frequently adopted by the young engineer that the profession owed him a job was a false one.

The New Council

WHAT then is this new Council and what are its purposes? Mr. C. F. Hirschfeld, its chairman, described these in a paper read at the Hot Springs Convention on June 26th. The joint body which has been set up comprises bodies expressly chosen to represent the educational, the legal, and the professional interests. They are the Civil, Electrical, Mechanical, Mining and Chemical Engineering Institutions, the Society for the Promotion of Engineering Education, and the National Council of State Boards of Engineering Examiners. The value of having a national organisation which shall function for the engineering profession in the same way as does the Medical Association for the medical profession, was emphasised. Indeed, Mr. Hirschfeld expressed the firm belief that such an organisation, effectively functioning, was essential if the engineer and the engineering profession were to meet the demands of government, industry, and social and economic progress. The "E.C.P.D.," as it is briefly described, is regarded as the first step in preparing for the coming generation of engineers. We feel that there are many engineers in this country who will watch this movement closely. Some will wonder whether, instead of institutions pursuing their own sectional course, there is not merit in seeking closer co-ordination.

Important Events in 1935

WHATEVER the programme of electrical convention events for the year 1935 may ultimately be, some importance attaches to the arrangements that are now being made for holding a Universal International Exhibition in Brussels from May to October. The Department of Overseas Trade has been taking preliminary steps toward British participation, and it is reported that the matter of a suitable pavilion is in hand. There is some likelihood that British industries interested in the Belgian market will make collective exhibits through their associations. Perhaps even more noteworthy, from the electrical point of view, is the celebration of the Silver Jubilee of His Majesty the King, which also takes place next year. Plans will be announced in Parliament shortly. Whatever form the celebration may take, the occasion will give electrical illumination the biggest opportunity that it has ever had, not only in these islands, but throughout the whole Empire. Electrical trading and contracting firms will be alert regarding the possibilities of business of certain kinds created by such an event.

New Generating Plant

ON July 13th we referred to the programme of the Central Electricity Board for extending selected stations by some 500,000 kW, and gave particulars of the plant for which the Board has already issued directions. This week we supplement this information with a list of other stations included in the programme. All except two of the thirteen stations have a thermal efficiency of over 18 per cent., and in one of the exceptions boilers only are being installed. Ironbridge, which began to supply in May of last year and for the seven months of its running obtained the best figure so far officially recorded in Great Britain—26.84—is early marked out for the distinction of increased capacity. The past performances of these stations are not the only criterion; the potentialities of their sites to meet future requirements is the main consideration. Good sites with modern plant should permit of an improvement in some cases, as has been demonstrated by the Y.E.P. station at Thornhill.

The Water Supply

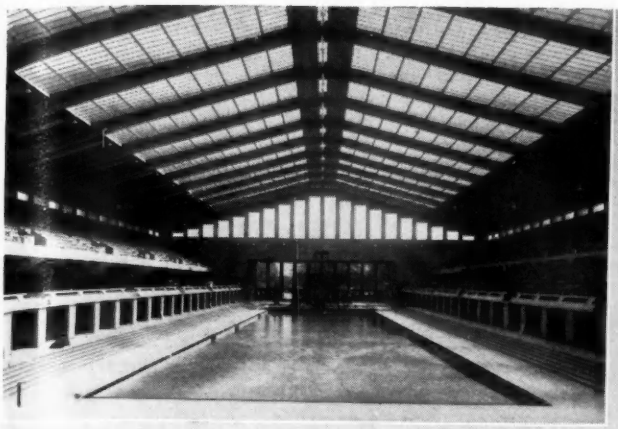
THE present water shortage was made the occasion in a Sunday paper for putting the case for a national water grid. It is a mistake to suggest by implication that the claims for this scheme rest upon the present unprecedented drought. The possibilities of the plan, with which Mr. A. E. L. Chorlton, M.P. (past-president, I.Mech.E.), is associated, are still under consideration by a technical committee, and any legislation introduced on its account would probably be long drawn out. Meanwhile, we have many rural areas in which a chronic water deficiency is merely intensified by the drought. Local pumping, unlike local generation of electricity, does not require constant attendance, and can be installed cheaply. The analogy between water and electricity grids should not be pushed too far. Large towns are naturally near water sources, pumping can have a hundred-per-cent. load factor and standage, and reduction in spare plant and economies in running costs have not the same bearing.

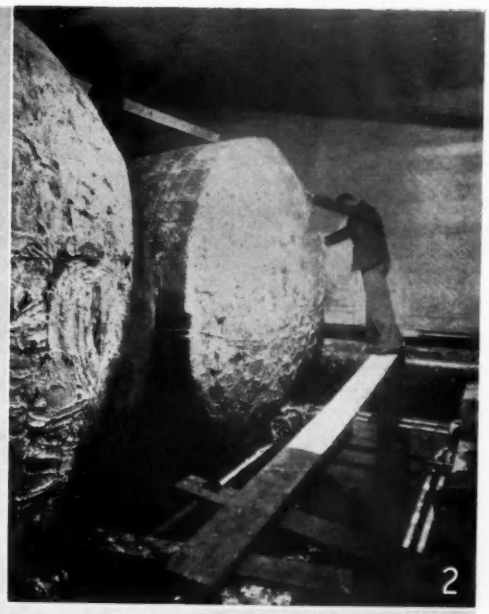
Lighting the Entrance

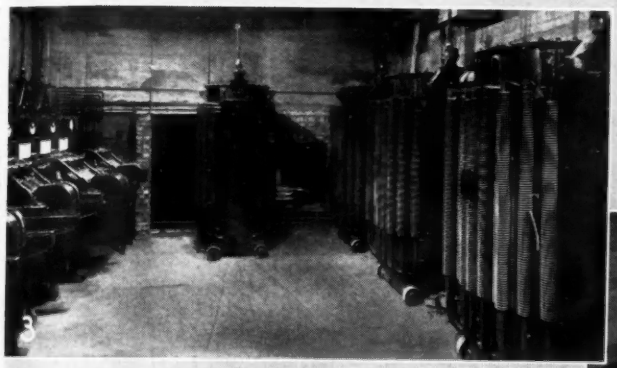
NEARLY five million of the eleven and a quarter million houses in Great Britain are connected to the mains. Yet one finds few front entrances lighted, although the advantages of doing so should be obvious. A newspaper report states that the doors of Berlin houses are to be fitted with illuminated number indicators, at a cost of £125,000, under an official plan for decreasing unemployment in the electrical industry. The ability to find a house easily by its number after nightfall is an additional advantage of porch lighting, which could be applied to existing houses at little individual expense and on new building estates at negligible extra cost. Another point in favour of porch lighting is that it gives an example of an apparently lavish use of electricity at a cost which need not exceed half a crown a year with a 25-W pearl lamp supplied under a two-part tariff. It may in cases obviate the continuous use of the hall light.

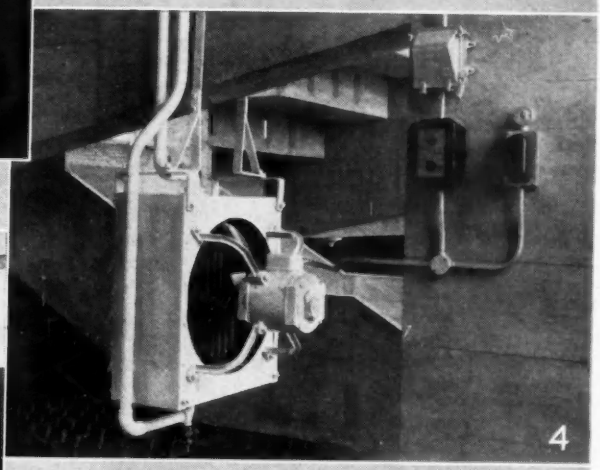
The Stand-by Margin

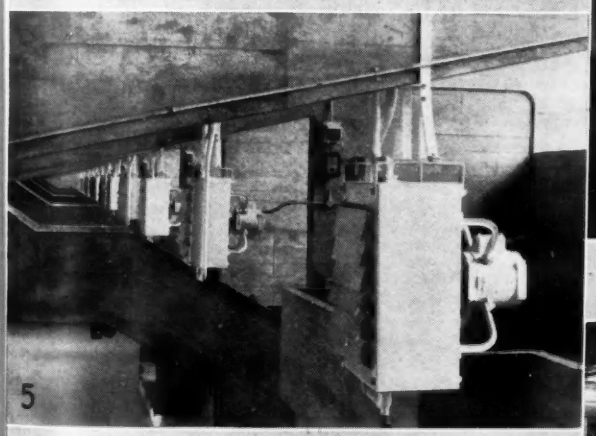
PART of the economic case for the grid rests upon the reduction in generation stand-by capacity possible through the interconnection of power-stations. American experience, as expressed in a recently published work, *Power Station Economics*, is that the margin should be ten per cent. of the estimated peak load for the following year for an interconnected system and 30 per cent. for an isolated system, provided in each case that this is greater than the capacity of the largest unit on the system. The Central Electricity Board proposes to rely upon 10 to 15 per cent. as a minimum. In view of the influence on the performance of overhead lines of the less severe weather conditions here and our more conservative practice in their construction, this margin should be good enough even having regard to the greater importance attached to reliability of supply in this country.

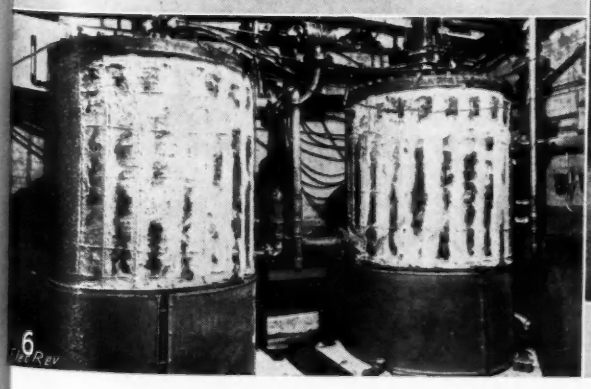












The Empire Swimming Pool and Sports Area, Wembley. **(See page 113)**

1. The sports arena, swimming pool and seating galleries. 2. Applying lagging to two of several heat-storage cylinders. 3. The main intake transformer chamber and high-voltage switchgear. 4 and 5. These arena fan-heater ventilators have thermostatic controllers on the galleries. 6. The main low-voltage electrode water boilers are here shown in process of erection. 7. A view of the metal-clad distribution board in the switchroom, with cables enclosed in sheet-metal ducts

Voltage Regulation and Revenue.

By E. V. Clark, B.Sc., M.Inst.C.E.

IN a discussion at the Institution of Electrical Engineers last session,* it was suggested that the increase in revenue of an electricity supply undertaking, caused by keeping its voltage well up throughout the area of supply, should in many cases go far towards recouping the cost to the undertaking of the regulating appliances necessary. That an even voltage, which provides the most satisfactory lighting and enables cooking to be done " by the clock," will stimulate sales by means of a satisfied clientele, there can be little doubt; but this is an entirely different matter. The point raised, put in a negative form, is that the loss of revenue due to low voltage and consequent low current taken by lamps and heating appliances is sufficient to be worthy of consideration.

Let us suppose that an undertaking which normally maintains voltage just within the late permissible margin of 4 per cent. up or down decides that for one week it will raise it by 2 per cent., without mentioning it to the consumers. What will be the effect of this change upon the week's revenue?

Taking first the metal filament lamp; whether vacuum or gasfilled, this has a positive temperature coefficient. A 2 per cent. increase of voltage will mean roughly a 1¾ per cent. increase of current; the power consumed will increase by about 3¾ per cent., and the illumination given by about 9 per cent. Assuming that consumers pay no heed to the light given, but burn the same lamps as under normal conditions, the consumption will increase by 3¾ per cent.

In a self-contained system, where electricity for lighting is sold at a flat rate, say 5d. per kWh, this increase will be almost all clear profit, since the cost of the extra kWh will be about one farthing each. With a two-part tariff there will be a comparatively small increase in revenue, of which up to 75 per cent. will be profit. Where energy is purchased from the grid, conditions will be much the same, provided that the week chosen for the experiment is not that of the peak load, and therefore does not affect the standing charge. Fixed contracts at so much per annum per lamp, such as in street lighting, will show a slightly reduced profit, as more kWh will be taken, but the number of lamps supplied under tariffs of this kind will be a very small proportion of the total connected.

Effect on Heating Appliances and Motors

Most radiators, cookers, &c., are wound with wire of nichrome or similar alloy having almost zero temperature coefficient. A 2 per cent. increase of voltage will mean an equal increase of current taken, and a 4 per cent. increase of kWh per hour with an increase of 4 per cent. in heat emitted. With radiators, the extra warmth will probably pass unnoticed, and the energy used by the radiators during the week will be up correspondingly. But with cookers, water heaters, and irons, the extra heat will generally not pass unnoticed without doing harm. Kettles will boil more quickly; cakes will need less time in the oven; thermostats on water heaters will act sooner; irons will have to be switched off more often when doing handkerchiefs and blouses, and tablecloths will be ironed more speedily.

Only in matters such as stewing meat and boiling potatoes will extra kWh be used; and here it will be to the direct loss of the consumer, who will derive no benefit from increased consumption in these directions. In general, however, increased rate of consumption by cookers, &c., will mean more rapid operation, and therefore higher efficiency in use, with less total consumption for the same result.

The speed of an induction motor is barely affected by a 2 per cent. change of voltage; in general the power taken in performing specific work is little affected by voltage. Efficiency and power factor are usually a shade better at high loads, and a shade worse at low loads, with increased line voltage; so these results may be expected to balance out. Domestic fans running at slightly higher speed with the increased voltage will circulate slightly more air, and take slightly more power; there are probably a few similar cases with industrial drives. On the other hand, centrifugal pumps, running until tanks are filled and then being automatically shut down, will probably be a shade more efficient at the slightly increased speed, and may therefore take slightly less energy for the same duty. In general the power taken by industrial motors, lift motors, &c., will be negligibly affected.

Efficiency of Distribution

A 2 per cent. increase in pressure throughout will mean a similar increase in flux density in transformers, and an increase of about 4 per cent. in their iron losses. A circuit consisting of lamps and radiators only would have current increased by about 2 per cent., and therefore copper losses in cables and transformers would be increased by 4 per cent., or about the same as the increase of consumption by these. With supply to motors, the efficiency should be perceptibly better, since for the same power the current would be about 2 per cent. less. But for cooking loads, &c., the copper efficiency is much as before, since there is a higher current for a shorter time. Thus, taken all round, the efficiency of distribution is probably much as before, provided the transformers are appropriate to the loads they have to carry. The result of the week's operation is summarised in the following table :—

Service.	kWh.	Amps. at peak.
Lighting	+3¾	+1¾
Electric fires	+4	+2
Cooking, ironing and water heating	0	+2*
Motors	0	−2

* Without allowing for improved diversity factor which would reduce this figure.

The crux of the matter when considering whether the results of a week's trial could be maintained if the increase in voltage were made permanent is that the consumer has paid the additional revenue unknowingly.

Most people install lamps of candle powers appropriate to the situation of lighting points. In general, if voltage is apt to be low in the early evenings, lamps of high candle power are used to ensure sufficient light at all times; if, in addition, voltage is apt to be high at 9.30 p.m. and after, 240-V lamps may be used on a nominal 230-V system to prevent too frequent replacements. Thus, when pressure is closely regulated, a 40-W 230-V lamp may be used, whereas with poor regulation, a 60-W 240-V lamp may be considered more satisfactory. Or again, with good regulation of pressure, husband and wife may read from the same lamp in the sitting-room, but with poor regulation separate lamps may be preferred.

True, a 2 per cent. variation of pressure means an increase of only from 46 to 50 c.p. or thereabouts; and lamps cannot be correspondingly changed when the voltage rises. Nevertheless, ten 40-W lamps at normal voltage consume less than nine 40-W lamps and one 60-W, so that it only needs one lamp in ten or so to be replaced by one of lower candle power, thanks to the improved voltage, for the gain in revenue to be eliminated.

Similarly with radiators. On a cold autumn evening, when many radiators are switched on and voltage is in consequence low, 1,000 W may be found insufficient, and 1,500 W may be used instead. With the old-fashioned four-lamp radiator a 2 per cent. variation would occasionally make the difference between three lamps and four. In modern radiators the steps are usually larger; and though small variations would not so often lend to the use of full heat rather than part heat, when this does happen its effect on the revenue is much greater. In many cases one switches on a radiator only to take the chill off the air; with the higher voltage it is on for a shorter period.

A Smaller Ultimate Consumption Possible

Thus a permanent increase in the voltage without better regulation is likely to have a merely temporary influence upon the quantity of electricity used in lamps and radiators, and that better regulation will most probably result ultimately in a smaller consumption by those lighting and radiator points already installed.

The assumption that by raising the voltage, whether with or without better regulation, one will for any length of time extract more money from the consumers without their realising it, is unjustified either by commonsense or by a detailed examination of the situation. That by maintaining a more even voltage upon the system one will enable those most economically minded to effect a slight reduction in their electricity bills, but by giving better value for money will encourage the bulk of consumers to increase their requirements, is an entirely different proposition, and one which appears to be thoroughly sound. The direct effect of better regulation, then, like that of lowering the tariff, is a loss of revenue; but the indirect effect should ultimately be a substantial increase.

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* " The Application of Automatic Voltage and Switch Control to Electrical Distribution Systems," by W. Kidd and J. L. Carr, B.Sc., *I.E.E. Journal*, April, 1934.

An Arc-welded Pipe-line

AUTOMATIC arc welding produced 13½ miles of longitudinal seams in the fabrication of a 4½-mile pipe-line connecting Bouquet Canyon Dam with San Francisquito power house on the line of the Owens Valley aqueduct about fifty miles from Los Angeles. This pipe varies in size from 80 to 94 in. in diameter with wall thicknesses of 1⅛ in. down to ⅜ in. The pipe sections were manufactured by the Western Pipe & Steel Co., of Los Angeles, using American General Electric automatic arc-welding equipment with two automatic welding heads on each welding machine. Each pipe section consists of three rolled plates with three welded longitudinal seams.

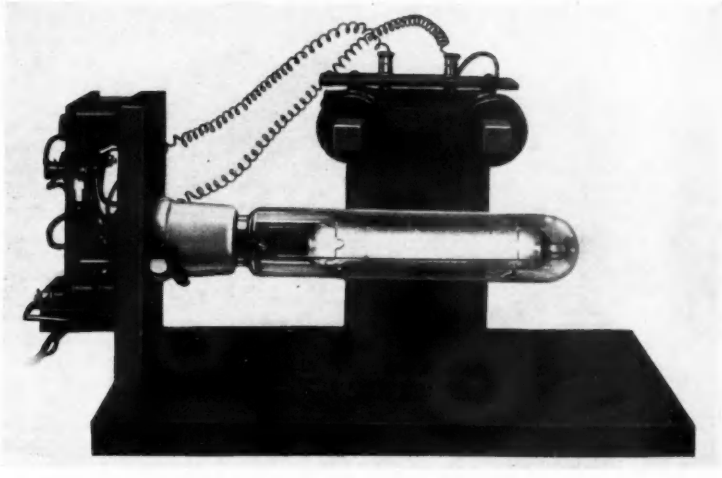
Horizontal Lanterns for Electric Discharge Lamps

By R. Maxted, B.E., and L. J. Davies, M.A., B.Sc.

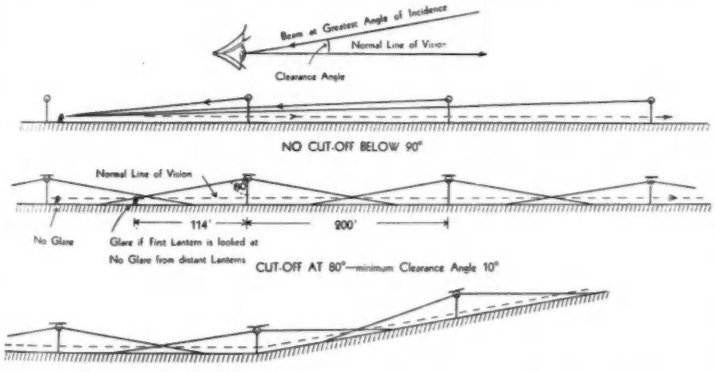
THE high-pressure electric discharge lamp has an inner tubular bulb measuring approximately 7 in. by 1¼ in. within an evacuated outer jacket. The dimensions of the bulb, and to some extent its efficiency, depend upon the wattage. In the 400-W size the light source is rectilinear and is about 6 in. long. The optical control of the light flux from this form of light source has presented some difficult problems in lantern design. For certain applications a linear light source is not disadvantageous if it can be placed horizontally, but hitherto all high-pressure discharge lamps have had to be mounted vertically.

A lamp operated horizontally may fail through the overheating of the glass by the arc, perhaps due to the glass softening sufficiently for the metal vapour (at nearly atmospheric pressure) to escape through a blow hole, or the luminous performance may be poor due to concentration of heat on the glass. The energy dissipated as heat is mainly due to the recombination of electrically charged particles and that resulting from the kinetic energy of moving particles.

In the older low-pressure electric arc, recombination of ions occurs largely at the walls of the tube rather than in the body of the gas. Owing to the low pressure (which rarely exceeds a few millimetres) and to this uniform heating of the surrounding wall, convection currents are of small magnitude and do not cause local overheating. In the newer high-pressure electric arc a good deal of energy is liberated in the gas itself, and very strong convection currents are set up which tend to influence the position of the arc. With the lamp placed vertically and with correctly designed electrodes, the space occupied by the arc is symmetrical about the vertical axis of the tube. In a horizontal position the arc is swept upwards by the force of the convection currents until it may play actually on the tube wall, with a consequent concentration of heat on a small area of the glass.



A laboratory model showing the arrangement of magnets in relation to the horizontally mounted high-pressure discharge lamp

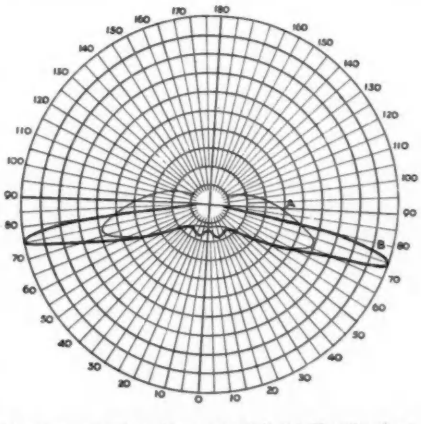


Angles and distances at which glare is experienced from street lighting units

Low-pressure arcs can, however, be operated successfully in any position. Familiar examples are the cold-electrode high-voltage advertising tube and horizontal tube of higher intensity with hot cathodes, which are also used to some extent for floodlighting. The luminous efficiency of these is low compared with the new high-pressure lamps.

Various methods have been tried with the object of overcoming the effect of convection currents and maintaining the central position of the arc. The control may be attempted inside the lamp by mechanically constricting the arc, *e.g.*, by a series of washers of heat-resisting material placed along the tube at right angles to the axis. Such methods are, however, open to the objection that they increase the cost of manufacture of a replaceable item, the lamp—and are liable to affect its electrical characteristics, luminous efficiency, and lumen maintenance.

A new method makes use of a control that is external to the lamp and forms part of the non-replaceable unit—the lantern. Such a control, of course, must be reliable and permanent; equally applicable to lamps of all voltages, with the variations in characteristics permitted by the allowed manufacturing tolerances; independent of mains voltage variations; and an integral part of the lantern so that there is no extra complication to the installer or user. The method has a magnetic control, and while it is not difficult to produce a magnetic field that will deflect an arc, considerable research has been needed to devise one meeting the requirements referred to that will maintain the arc always as a straight line in the centre of the tubular bulb. Moreover, the connection of the field must be to the lamp terminals to make it entirely self-contained within the lantern. As these lamps operate on a.c., the current in the magnetic field has to be in phase with the arc current. In spite of such problems, the unit designed is simple and the control unit cannot be seen without a careful examination of the lantern. Lamps that have been under test in the B.T.-H. laboratories for some considerable time, operating horizontally, show no difference whatever in luminous efficiency or lumen maintenance when this type of control is used.



Polar curves showing typical light distributions given by lanterns equipped with "Mercra" lamp (a) vertically mounted and (b) horizontally mounted

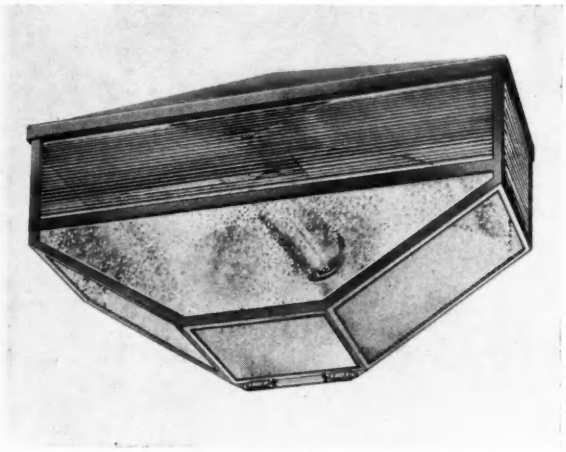
The control circuit includes magnet windings and pole pieces. Its operation is independent of the installation power factor, and of the supply voltage.

The remaining characteristics required of the controlling field are automatic adjustment to suit the lamp current and a minimum consumption of power. The circuit provides a solution to the first problem, in that if the lamp current is high, as happens in low-voltage circuits since the lamp watts remain constant, the lamp voltage is lower, and the magnetic field is proportionally reduced. The problem of minimising the power consumption has two aspects. First, the magnetic field must be brought into suitable phase with the lamp current, so that a maximum effect is obtained from a given flux density. Secondly, the magnet pole construction must be such that flux leakage is a minimum, and as high a percentage as possible of the total magnetic flux produced is utilised. Exhaustive testing of a number of control circuits has resulted in the selection of this arrangement.

In general, the function of a street lighting unit is to provide

even illumination of a rectangular area in the horizontal plane. There are two main optical problems: for intrinsic efficiency the light which is shining away from the surface to be illuminated must be re-directed to the fullest possible extent on to that surface; and for actual efficiency stray light must be prevented from shining into the eyes of an observer.

The polar curve of the "Mercra" lamp shows that with the



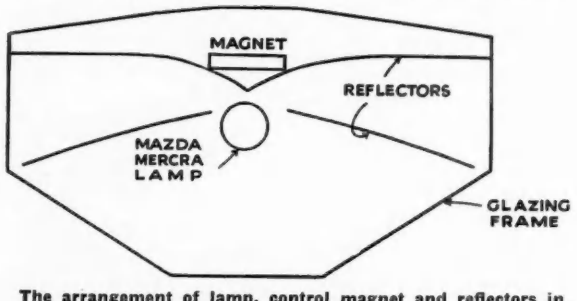
The new street lighting "H" lantern for a horizontally mounted lamp

lamp operating in either a horizontal or a vertical position, 50 per cent. of the luminous output is radiated above the horizontal. For efficient illumination it is, therefore, necessary in both cases to re-direct in vertical planes more than half the light output of the lamp.

With the vertical lamp the source has the greatest dimension (several inches) in the plane of major re-direction. When a high concentration and an accurate re-direction of light are required, a source should have the smallest possible dimension, and the disadvantage of the vertically operated lamps is evident. Accurate control is possible if the source is treated as a number of small sources, as in the case of a louvred lantern, but this means a considerable sacrifice of efficiency.

Theoretically, efficient and accurate control is obtainable only by the use of reflectors or refractors of such dimensions that the arc approximates to a point source. This solution demands a large or special optical system. With the horizontally operated "Mercra" lamp the smallest dimension of the source is in the plane of major re-direction, and more accurate and efficient control is readily obtained with reflectors of a convenient size and simple shape. With the vertical lamp the normal distribution in the horizontal plane is circular so that here again a major re-direction is necessary, with attendant losses. The horizontal lamp, on the other hand, gives roughly a rectangular distribution in the horizontal plane and, with central suspension, little or no re-direction is needed. Even in the case of roadside mounting sufficient re-direction is provided by a single plane reflector, but a simple refractor panel below the lamp may be used to give a strengthened lateral throw.

For road lighting the horizontal unit has several definite



The arrangement of lamp, control magnet and reflectors in an "H" lantern

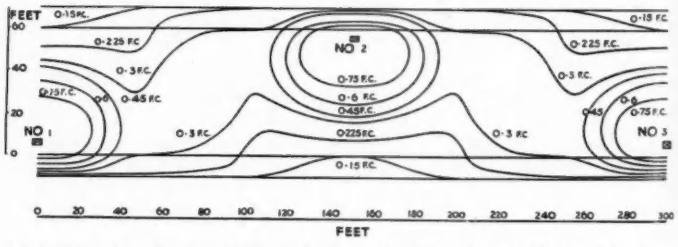
advantages. In the first place the lantern offers a higher intrinsic efficiency. Apart from the evidence of the distribution curves the luminous output suffers less interference from reflectors and refractors, and losses due to absorption are, therefore, correspondingly lower than for the vertical unit. A far more important advantage results from accuracy of light control. The polar curves show the sharp cut-off obtainable below the horizontal with the horizontal lamp, which obviates glare. The normal line of vision of a road-user is the horizontal from the eye and, if the lantern cut-off is below the horizontal, no high-intensity beam can come directly along this line of vision.

With a lantern mounting height of 25 ft. and a sharp cut-off at 80 deg. from the downward vertical the maximum spacing obtainable is approximately 275 ft. Under these conditions, with the observer's eye 5 ft. above the road, no beam can be seen if the lantern is more than 115 ft. away, even when the lantern is viewed directly. Within 115 ft. uncomfortable glare is experienced *only* if the lantern is looked at directly. It is preferable to cut off at a smaller angle, such as 70 deg., thus increasing the angle between the normal line of vision and the maximum beam. This, however, would be costly, in that it reduces the maximum obtainable spacing of units.

In the floodlighting of verticle surfaces the same arguments apply, as regards efficient and accurate control, as in the case of the road lantern. With virtually a point source of light in the plane of re-direction it is easy to obtain the high concentration of luminous flux required for carrying an even illumination to the upper parts of a tall building.

The new "F" lantern for horizontally mounted lamps used to floodlight the Adelphi Hotel for the 1934 I.M.E.A. Convention

So far, two horizontal lanterns have been developed, one for roadway illumination and one for floodlighting. In designing the road-lighting lantern full use has been made of the optical advantages which have been outlined to construct a glare-free lantern capable of illuminating the widths met with in modern arterial road



Iso-foot candle diagram from test on an "H" lantern with a 400-W lamp

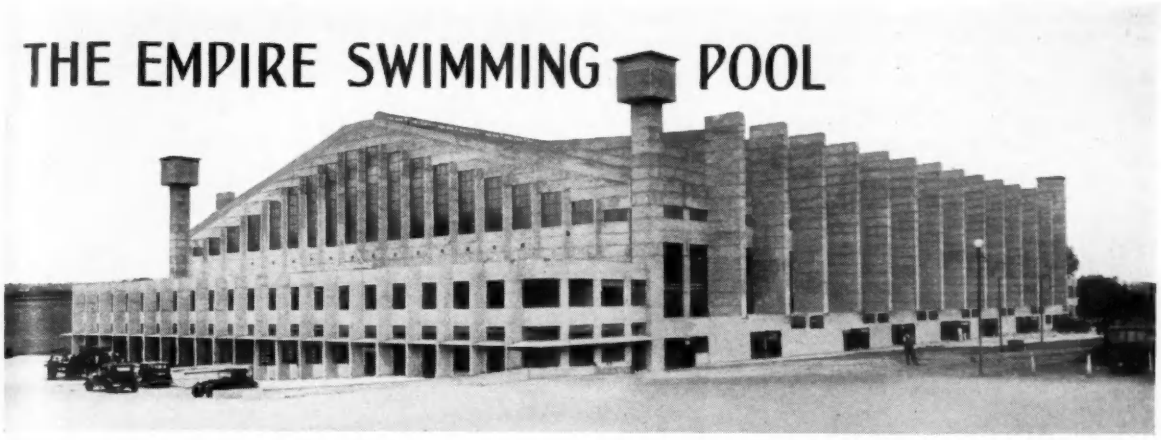
engineering. The lantern is particularly adaptable to by-pass roads in which, while adequate illumination is desirable, economy resulting from wide spacing is essential.

The iso-foot candle diagram makes allowance for deterioration in total output owing to fall in lumens during life and obscuration through dirt on external lantern surfaces. The road is 60 ft. wide, with a lantern spacing of 150 ft. Included in the drawing are grass verges each 10 ft. wide, giving a total width of 80 ft. The road receives a minimum of 0.15 ft. candles, while the major part of the roadway is illuminated at an intensity of over 0.3 ft. candles. The maximum immediately under the lantern is 1.5 ft. candles. The minimum on the grass verge is 0.08 ft. candles.

A 60 ft. road, allowing six traffic lanes, is exceptionally wide, and although the iso-foot candle diagram is, considering the width of the road and the lantern spacing, very favourable, it should be emphasised that the driving conditions on the road cannot be determined adequately by such diagrams. Important factors that cannot be shown on such diagrams are the angle at which the maximum beam candle power strikes the road, and the beam candle power entering the eye of an observer at various angles. These are shown in diagrammatic form for the vertical plane passing through the lantern and parallel to the direction of the road.

Road gradients can be dealt with either by tilting the horizontal lantern as a whole, or in special cases by altering the angle of mounting of one set of reflectors. This is a valuable feature of this type of construction.

THE EMPIRE SWIMMING POOL



THE Empire Swimming Pool and Sports Arena that has been constructed in the old exhibition grounds at Wembley Park as a centre of aquatic sports, ice hockey and skating, boxing, &c., is a building of more than usual interest structurally.

It is 420 ft. long, the 90-ft. high glazed roof having a span width of 240 ft. It has been constructed by Holloway Bros. (London), Ltd., of reinforced concrete on the cantilever principle and is devoid of girder or column obstruction. The official opening took place this week.

Approximately 13,000 spectators can be accommodated, with permanent seating for 5,000 on galleries on each side, beneath

The main arena lighting units mounted in the roof

which are 250 bathers' dressing boxes with 1,250 clothes lockers. The pool is 200 ft. long and 85 ft. wide, with a maximum depth of 16 ft. at the diving end.

Most of the machinery is housed in the basement and the whole of the electrical work has been carried out to the design and instructions of the engineer-in-chief, Sir E. Owen Williams, and the electrical and mechanical consultant, Mr. Vernon Hardy, by Messrs. Troughton & Young, Ltd.

The North Metropolitan Electric Power Supply Co. has budgeted for an initial connected load approximating to 2,500 kVA. Two a.c. three-phase, 50-cycle, 11,000-V feeders enter a basement chamber containing five 500-kVA B.E.T. Co. step-down transformers. Reyrolle isolating and bus-bar sectionalising switchgear is provided on both high- and low-voltage sides. The transformers have fin radiator pipes and the chamber is ventilated through sheet metal ducts. The transformers were lowered through the ceiling of the sub-station.

For 415/240-V, three-phase, 4-wire distribution a common set of four bus-bars enclosed in sheet metal ducts passes into an adjoining switch chamber. Each one is controlled by an oil-immersed three-phase and neutral Statter circuit breaker, the total rupturing capacity being 65,000 kVA.

For further sectionalising this room contains an industrial type switchboard 22 ft. long on which are mounted twelve ironclad "Vincent" double-pole switch-fuses varying in capacity from 25 to 60 A on the lighting side, and fifteen similar switch-fuses varying from 25 to 200 A on the power side.

The main services are divided as follows: Nos. 1 and 2 for water heating, each 850 kVA; No. 3 for main power, 450 kVA; No. 4 for domestic hot water, 60 kVA; Nos. 5 and 6 for primary (150 kW) and secondary (14 kW) lighting.

The whole of the primary lighting fittings throughout the building have been designed for even distribution over the entire working plane. The main lighting of the arena is from a battery of twenty-four 1,500-W concentrating type reflector fittings mounted in the central roof gangway. Over each gallery is a row of fifteen 1,000-W dispersive reflectors.

An inverted cone ceiling fitting utilising a naked opal lamp is employed throughout the promenade restaurant, bathing terraces, buffets, kitchens, and turnstile halls. Dispersive reflectors are installed for staircase lighting and for the main plant rooms in the basement.

Special Lighting Requirements

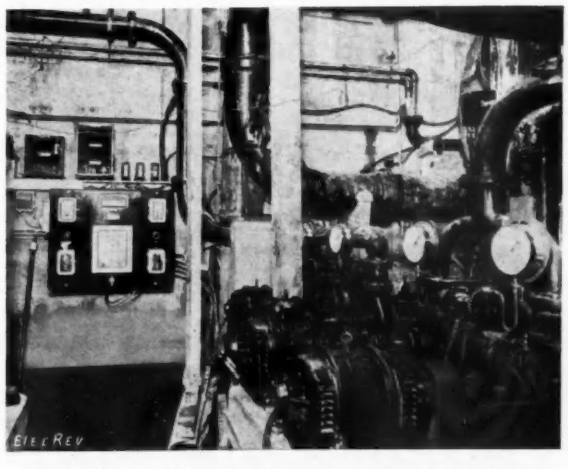
To comply with the Middlesex County Council's requirements way-out signs are wired to a special circuit which is entirely independent of any other primary lighting. All lighting throughout the arena, promenade restaurant, and bathing terraces, is group controlled from the main switch room. The public cloak rooms, kitchens, and staff portions of the premises are switched from local control positions accessible to the staff only.

A centre lighting canopy is to be suspended from the roof for lowering down on to the boxing ring. It is to be fitted with sixteen 1,000-W mirrored reflector concentrating units, fed from the single-phase side of the system and controlled from the main switch room.

Two 2,000-W spot lights are to be mounted in the roof for spotting on to the pool, while for underwater floodlighting there has been installed on each side of the bathing pool, at a depth approximately 3 ft. below the surface of the water, a battery of fourteen 500-W projector lamps, with provision for colour screens if required. This floodlighting is collectively controlled from the main switch room.

For secondary lighting "Keepalite" plant is installed with a capacity of 40 kW, consisting of a Chloride battery of 120 cells of 200 Ah capacity continuously trickle charged by means of a Westinghouse rectifier, and with an auxiliary Mawdsley motor generator for quick charging. This plant will maintain the whole of the secondary lighting load for three hours in the event of the primary supply failing.

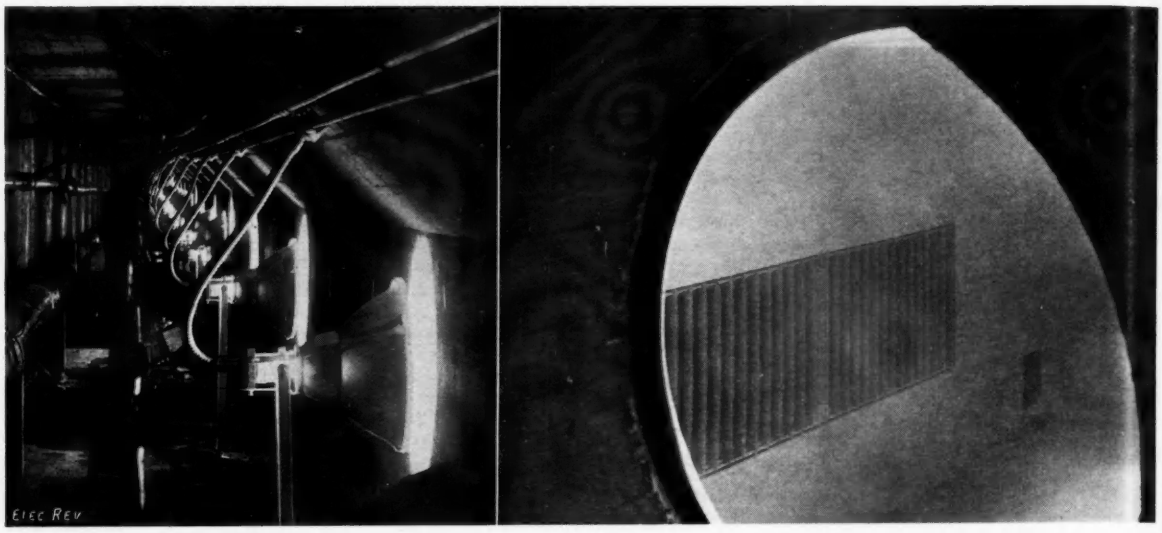
Secondary lighting points are provided in all public toilet rooms, staircases, and exit corridors. Alternate points are



A view of the control gear and pumps for the electrode boilers, during erection

connected to secondary and primary supplies. A number of high wattage secondary lighting points are fitted over the arena, galleries, turnstile halls, and promenade restaurants, to give sufficient illumination for the public to leave the building in emergency. Duplicate points, primary and secondary, are installed on the exterior of the building.

Electricity is employed for heating the building and the pool water, and for this purpose two electrode boilers, each rated at 870 kW at 415 V, 3-phase, with their attendant controlling switchgear, were supplied by Bastian & Allen, Ltd., who were responsible also for the design of the automatic arrangements for controlling the heaters.

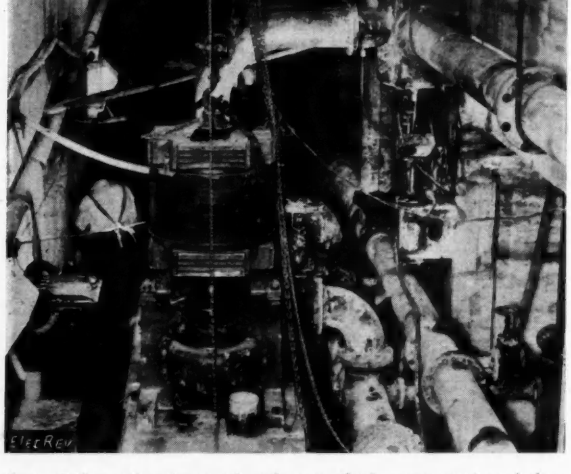


The underwater lighting units (left) and a porthole view through the water showing the wave-forming grid 50 ft. away

For heating the swimming pool the water from the bath is circulated through filtration plant supplied by the Paterson Engineering Co., Ltd., and thence through the boilers. An electrical interlock is provided so that the electrode boilers will automatically be switched off should the circulating pump be stopped, while the boilers cannot be switched on unless this pump is running. The 55-h.p. pump is driven by a Crompton Parkinson motor, operated by a float switch and oil starter. Other small pumps are also driven by Crompton motors. Electricity for heating the pool is only taken during the supply company's off-peak hours, a master time switch being employed to restrict the hours when current may be used.

Heating the Building

For heating the building a thermal storage scheme is employed. The boilers are used to heat up a storage of 36,000 gallons capacity, and current for this purpose is again only taken during off-peak hours, controlled by the time switch already referred to. Altogether thirty-six ventilating fan-heaters are distributed throughout the building. Each consists of a nest of hot water circulating pipes enclosed with a fan driven by a Bull motor. Each group of fans is controlled collectively from the switch room, besides having individual "Satchwell" thermostats and Igranic local controllers for automatic operation.



One of the pair of wave-forming vertical pump motors being lowered into position

Besides the time switch, the boilers are controlled by an automatic load control device fitted to each boiler, while the flow temperature of the water from the boilers is again automatically controlled. When any of the controls operates to shut down the boilers, the load taken is automatically reduced to the minimum before the circuit breaker opens. These automatic oil breakers comprise sheet steel floor mounting cubicles, being solenoid operated, and were supplied by Johnson & Phillips, Ltd.

Either boiler can be employed for heating the swimming pool or the storage cylinders; the two boilers together can be employed for heating either the pool or the storage, while also one boiler can be employed for heating the pool and at the same time the second boiler can be employed for heating the storage water.

When heating the pool, the boilers are under the control of a specially sensitive thermostat situated in the return main from the swimming pool, so that the temperature of the pool is maintained within a degree or so of the required temperature. When heating the storage, the boilers are under the control of thermostats situated in the storage cylinders.

The domestic hot water requirements in the various parts of the building are dealt with by a separate 2,000-gallon storage, heated during off-peak hours, supplemented by local water heaters situated in the various lavatories, &c. The storage tank, which is 7 ft. in diameter by 9 ft. 6 in. high, is fitted with two banks of Bastian immersion heaters rated at 30 kW each and arranged to give a balanced load on the three-phase supply. It is controlled by a master time switch during off-peak hours and the load is controlled thermostatically through an automatic contactor panel. The whole of this equipment is also situated in the basement.

The local water heaters in the various lavatories are fourteen 11-gallon and two 30-gallon capacity Bastian pressure-type heaters.

The whole of the heating and hot water supply installation for the building has been carried out by Messrs. Jas. Combe & Son, Ltd.

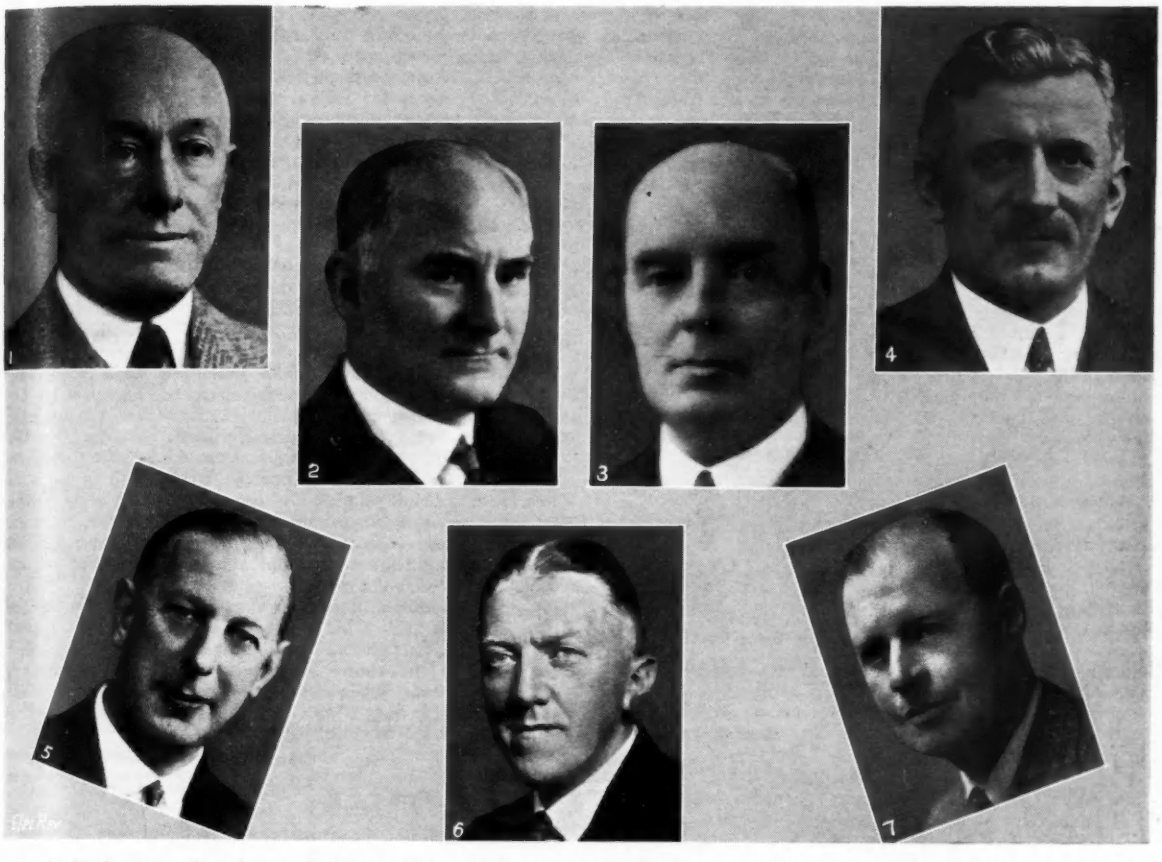
Wave Making and Ice Plant

Adjacent to the deep end of the swimming pool two wave-making machines have been installed by the Paterson Engineering Co., Ltd. Each is driven by a 100-h.p. slip-ring vertical spindle Crompton motor, manually controlled by auto-transformer starters, with an additional small auxiliary pumping set.

For freezing the rink which is to be laid over the swimming pool in winter for ice hockey and skating duplicate compressor plant is being installed by L. Sterne & Co., Ltd., consisting of two 90-h.p. compressors, two 22.5-h.p. brine pumps, and two 4.5-h.p. water pumps, interlocked wiring being provided for ensuring a collective run to each set.

Main and circuit wiring to the motor control panels, together with rotor wiring between starter panels and motors, is carried out entirely with fibre or v.i.r. insulated, lead-covered, single wire armoured and served cable, wiping joints and armour clamps being provided at terminal points. Over twenty miles of v.i.r. cable and two miles of twin 3-core and 4-core armoured cable have been installed on the power, heating, and lighting installations, of Callender's and Macintosh "Vicma" makes.

Some Driving Forces in the Industry: Automatic Electric Co., Ltd.



1. A. F. Bennett (*Jas. Bacon & Sons*), chief engineer and director. 2. T. A. Eades, manager and director. 3. G. W. Moore (*Elliott & Fry, Ltd.*), chairman and managing director. 4. J. Nixon (*Jas. Bacon & Sons*), works manager and director. 5. F. C. Burstall (*Jas. Bacon & Sons*), director. 6. Sir Alexander Roger, director and financial advisor. 7. E. Taylor (*Corin, Haslemere*), director.

The Measurement of Voltamperes.

By G. W. Stubbings, B.Sc., A.M.I.E.E.

OF the three possible definitions of apparent power in three-phase circuits, the one best suited to practical measurement is that known as the total equivalent voltamperes, or the square root of the sum of the squares of the watts and the reactive voltamperes. Voltamperes, so defined, can readily be determined from the readings of instruments which give watts and reactive VA, and this method is used to a large extent. The commercial instruments employed for this purpose are usually of the integrating pattern, and they are generally used with instrument transformers.

While the effect of errors of calibration of the meters, and errors of ratio of the transformers, on the value of the voltamperes is fairly obvious, the effect of phase errors is not so evident. A reactive meter in a circuit having a power factor nearly unity will have a large percentage error with a small phase error, but as the ratio of the reactive VA to the watts is small, the effect of the large error of the reactive meter on the value of the total equivalent VA, as determined from the meter registrations, is not necessarily great.

When the phase errors of the energy meter and the reactive meter are equal and of the same sign, a little thought will make it quite clear that these errors will not affect the value of the VA, since the effect of equal phase errors is the same as that of an alteration of the circuit power factor, a quantity of which the VA is inherently independent. Were reactive meters as simple in principle as energy meters, this equality in phase error might be expected generally to obtain. Reactive meters are, however, almost invariably externally compensated, by the use of artificial voltages, and the accuracy of the compensation depends upon the balance of the line voltages of the circuit metered. Appreciable phase errors in reactive meters may therefore appear which are additional to those of the meter element or of the instrument transformers, and the sign of these errors may be the same as, or opposite to, those of the energy meter. The possibility of sensible error in the determination of VA from the registrations of energy and reactive meters is therefore worth investigation.

If α be the overall phase error of the energy meter, a positive sign meaning that the meter reads fast with lagging power factors, and if β be the overall phase error of the reactive meter, the watts by the energy meter will, due to phase error, be $W(1+\alpha \tan \phi)$, while the VAR by the reactive meter will be $X(1-\beta \cot \phi)$, W and X being the true values of the watts and reactive VA. As the error terms are small the squares of these quantities will be respectively $W^2(1+2\alpha \tan \phi)$ and $X^2(1-2\beta \cot \phi)$, and the VA given by the meters will be $M(1+\alpha \tan \phi \cos^2 \phi - \beta \cot \phi \sin^2 \phi)$, or $M(1+\frac{1}{2}(\alpha-\beta) \sin 2\phi)$, where M is the true value of the VA. If α and β are equal, the resultant error in the VA is zero, as has been seen above. The maximum value of the error occurs when $2\phi=90°$, and $\phi=45°$, and the fractional value of the error maximum error is then $\frac{1}{2}(\alpha-\beta)$ where α and β are in radian measure.

We have seen that phase errors in the reactive meter can be caused by voltage unbalancing, and it appears that a possible value of the quantity $\frac{1}{2}(\alpha-\beta)$ can be two degrees. The radian measure of W 2 degrees is about 1.1 per cent., and the error of the determination of VA with such an error will, assuming the phase error of the energy meter to be negligible, be 1.1. per cent. when the circuit power factor is 0.707, corresponding to a phase angle of 45 deg. If the power factor is 0.866, ϕ will be 30 deg., and the percentage error in the VA will then be 1.1 sin 60°, or about 0.9 per cent.

The possibility of appreciable phase errors in reactive meters seems inevitable when the phase compensation of such meters depends upon accuracy of the balance of the line voltages in the circuit metered. The magnitude and sign of these errors depend upon the conditions of loading, and cannot be predicted with any degree of certainty. The highest accuracy in the measurement of total equivalent voltamperes will only be obtained when an internally compensated reactive meter can be evolved. Instruments have been proposed for the measurement of voltamperes, in which copper oxide rectifiers are employed, but they do not measure what is called the total equivalent voltamperes in an unbalanced three-phase circuit.

Efficient Electric Cookers. By Ester Purvis

FROM time to time letters in the trade Press point out the inefficiency of the electric cooker. Such letters appear far too often and are written generally by highly technical men who have, no doubt, all their lives aimed at a hundred per cent. efficiency. This perfection may be vital when generating electricity, but when using cookers it is neither vital nor desirable, if other factors have to be ignored to gain such efficiency.

As the primary object of the electric cooker is to produce heat, naturally the highly technical observer makes his attack on the score of heat efficiency. He proves by various calculations that a boiling plate, for example, has perhaps only fifty per cent. heat efficiency and he shows, again by calculation, how mistaken the manufacturers are in producing heat on the lines they do and how much more efficiently it could be produced if only (he argues) the manufacturers would listen to him and be less obstinate and not so conservative.

Miss Ester Purvis

Everyone admits that a hundred per cent. heat efficiency is a very worthy object, and even if only seventy per cent. is obtained much headway has been made, but that heat efficiency is useless if in obtaining it the manufacturer has overlooked the practical use to which the electrical element is to be put, coupled with the human element. Cookers must be given to the public devoid of "gadgets." They must be straightforward heat producing appliances, flexible from the point of view of heat, easily controlled and readily understood by everybody.

It may not be generally known that the greatest sale of electric cookers is amongst the poorer classes. These people have not time to be careful over minute details. They have a hundred other jobs to do in addition to cooking, and for such people a cooker must be made foolproof. Very often self-contained utensils are advocated on the score of heat efficiency. They have a higher heat efficiency, obviously, but it is hardly reasonable to expect the harassed housewife to be willing to use a self-contained saucepan after she has been warned that it must never be allowed to boil dry; it must never be immersed in water; and certain foods must constantly be stirred.

Even the electric kettles so frequently forced on the consumer have proved to be a two-edged sword. The electric kettle may have a comparatively high heat efficiency, but it also may have a high maintenance cost simply because it is allowed to boil dry; the flex is allowed to trail across a hot boiling plate and burns through; it is stood on a hot boiling plate; or it may leak. In short, used as an adjunct to a cooker, the electric kettle is a "gadget."

Surely it is admitting a fault (which really does not exist) to advise the use of an electric kettle with a cooker. If two pints of water will boil on a hot plate in nine minutes there is nothing to grumble about. Consumers should be advised to use ordinary kettles with a wide base and to use them as they would with coal or gas fires. If the right saucepans are used there is no appreciable difference between the time taken to boil liquids on electric cookers and on cookers heated by other means.

Choose a Suitable Saucepan

Eggs, for example, can be boiled on an enclosed type of boiling plate in six minutes, even starting with a cold plate and cold water. A flat pan with a wide base about seven inches in diameter is used; it should be fitted with a lid and should not have a spout. The eggs are put in the pan with two tablespoonfuls of water and the lid placed in position. Given normal pressure with the switch at full heat the water will boil in three minutes; then allow another three minutes and the eggs will be cooked. They are, of course, cooked in steam. The pan does not boil dry, there being usually a tablespoonful of water left. There can be no objection whatever to cooking eggs in this way.

The boiling of milk in small quantities has also come up for criticism; here again, it is merely a matter of a suitable saucepan. A large flat pan must be used even though the milk barely covers the bottom of it. A half-pint glass of cold milk will boil on a totally enclosed 1,700-W hot plate in four minutes. The radiant-type boiling plate which is fast becoming popular is slightly quicker. It is for the electrical industry, and particularly demonstrators, to bring out these special features on every possible occasion, and to teach the public to avoid using small saucepans to obtain best results.

An Inexpensive Method

Electricity at even ½d. per unit can be an expensive means of applying heat for cooking purposes if it is used extravagantly and without reasonable care. On the other hand, it can be the most inexpensive medium obtainable if just a few moments' thought are given to it. There are many ways of proving this, one of the most sensible being to use one part of the cooker only when cooking a meal suitable for the average middle-class family. A complete meal can be cooked on the boiling plate by using a multiple compartment steamer or by using three or four pans on one boiling plate (it is essential to have a rectangular plate to keep three pans boiling). The following menu is an example: Soup, steamed fish, marrow, potatoes, white sauce and treacle pudding. All this is cooked on one boiling plate at an approximate consumption of one kWh for six to eight persons.

Complete dinners, more than enough for six people, can be cooked on the grill, using only ¾ kWh. The menu is: grilled steak (2 lb.), tomatoes (1 lb.), boiled potatoes (2 lb.), cabinet pudding and jam sauce. The time taken to cook this meal is twenty minutes. Meals can also be cooked in the oven without using the boiling plate or the grill boiler, such as toad in the hole, mashed potatoes, jacket potatoes, macedoine of vegetables and fruit pie. These can be cooked completely for 1.4 kWh in an hour (exclusive of the time taken to heat the oven). The quantity is sufficient for five to six persons.

Automatic Cooking

It is not generally realised how much food can be cooked in an oven. From force of habit part of the food is put in the oven, and a boiling plate is used to cook the vegetables. Frequently manufacturers are urged to fit thermostats to ovens, but there is really little use for these on electric ovens; providing pressure is constant, automatic cookery is already assured. The last-mentioned meal can be left for 1 to 1½ hours after setting the switch in the required position, and no more thought need be given to it until the time comes for serving. There are, of course, occasions when it is advisable to use two parts of the cooker; for example, if a very large joint is to be cooked a boiling plate must be used for the potatoes. Is it not possible for the "unbelievers" in the electrical industry to be shown that the examples I have mentioned are all common everyday practices? It may fall to the lot of a consumer some day to instruct the industry, and what an extremely awkward position this would create for some of those who have not enough knowledge of electric cookers and yet are trying to sell them.

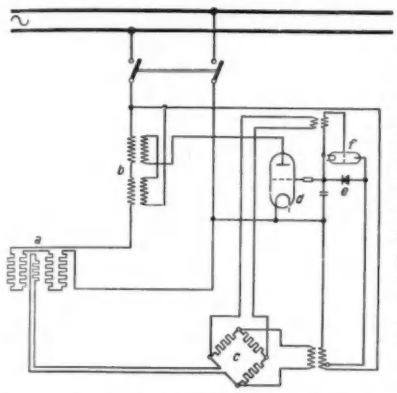
A complete dinner may be prepared in the oven in this manner (left) or, without using the oven, a meal for six persons can be cooked in this way (right)

Furnace Temperature Control

The use of vacuum tubes

A METHOD of controlling the temperature of an annealing furnace within ± 800 deg. C. by vacuum tubes, was described in Siemens-Zeitschrift recently. The underlying principle is that fluctuations in furnace temperature cause corresponding variations in the indications of a resistance thermometer mounted in the furnace. These variations control the ignition point of a hot-cathode rectifier, which in turn controls the energy supply to the furnace.

The resistance thermometer consists of platinum wire embedded in a small "Sinterkorund" tube and is connected in one limb of an a.c. bridge that can be adjusted by hand, the point of balance representing the required furnace temperature. The resultant bridge voltage influences the grid of the first vacuum tube in accordance with the well-known "soft" control principle. During the negative half cycle a condenser is charged by the agency of a metal rectifier up to the maximum amplitude of the a.c. wave, and during the positive half cycle it discharges through a resistance. The value of this resistance determines the instant at which the voltage curve of the condenser intersects the ignition ordinate of the rectifier. By varying the value of the resistance the actual ignition point of the rectifier can be shifted over the whole positive half cycle.



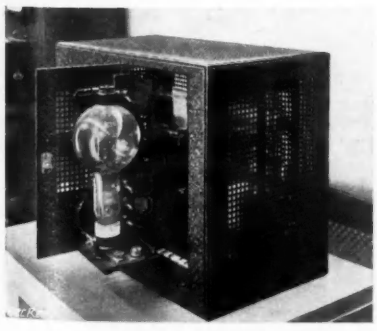
Circuit diagram of temperature control system: a = furnace, b = choke, c = bridge, d = grid-controlled rectifier, e = metal rectifier, f = high-vacuum tube

In the present system the variable resistance takes the form of a second vacuum tube on whose grid is imposed the resultant bridge voltage. In this way the internal resistance of the tube is made to fluctuate in accordance with the instantaneous furnace temperature. This results in a variation of the ignition point of the main rectifier.

When the temperature of the furnace is too high for the use of resistance thermometers the bridge system is replaced by a radiation bolometer or a photo-cell.

The Chopper-bar Regulator

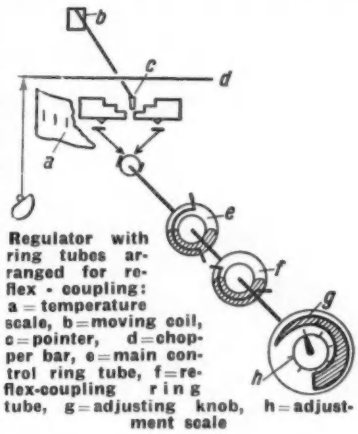
Alternatively, the temperature control system may be applied with vacuum tubes in conjunction with the "chopper-bar" regulator, which can be connected to any appropriate resistance thermometer, thermo-couple or ardometer. The variation in grid potential is effected by a control resistance in the form of a spiral resistance sealed into a glass tube bent in the shape of a ring. The resistance occupies about one-half the circumference of the tube, the other half being filled with mercury. On rotating the tube, the mercury short-circuits a number of turns, thus varying the value of the resistance.



Temperature control gear open

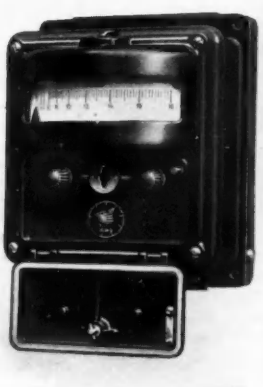
The rotation of this ring tube is governed by the indication of the chopper-bar instrument and thus the temperature is maintained substantially constant. An arrangement is also adopted whereby with small variations of temperature the corresponding control exerted by the ring tube is small, but with large fluctuations from the optimum value the control effect can be up to eight times as great. This is effected by the use of a second ring tube mounted on the same shaft as the first. The second tube is incorporated in a "reflex-coupling" device, and is connected in series with the moving-coil system of the temperature regulator. This produces what is termed a "rigid" reflex-coupling whose "variation factor"* can easily be set in accordance with the thermal inertia of the furnace.

If the variation factor is very large the "rigid" reflex-coupling can be replaced by a "flexible" reflex-coupling, which consists of a device whereby the reflex-coupling tube is returned to its pre-set position after having been rotated by the regulator through an angle corresponding to the temperature variation from the optimum. The speed of return is limited by a damping mechanism. This system must be adopted when the thermal inertia of a furnace is very great and the energy demand fluctuates between wide limits. If "rigid" reflex-coupling were employed the temperature would fluctuate over the whole extent of the variation factor which might be 15 per cent. of the full scale deflection, but with flexible reflex-coupling this is impossible.



Regulator with ring tubes arranged for reflex-coupling: a = temperature scale, b = moving coil, c = pointer, d = chopper bar, e = main control ring tube, f = reflex-coupling ring tube, g = adjusting knob, h = adjustment scale

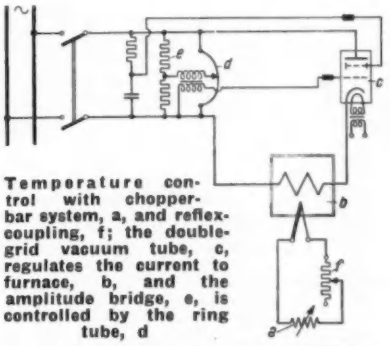
The entire regulating and reflex-coupling mechanism is incorporated in a simple housing. By dropping the front flap the optimum temperature value and the energy supply to the furnace can be pre-set by merely adjusting the knobs which communicate with the chopper-bar mechanism and ring tubes respectively. A special advantage of the method described is that the vacuum tubes are controlled from a standard temperature regulator with a visual scale. As the control resistance is in the form of a ring tube, all the available vacuum tube circuits can be employed.



Chopper-bar regulator with back-coupling

A Siemens-Schuckert furnace was recently demonstrated in which the temperature control was effected by means of a hot-cathode rectifier with dual grids. The furnace was fed direct from a single-anode tube, but the same principle can also be applied to tubes with a plurality of anodes.

For large furnaces the main current feed is preferably controlled by a series choke coil, on which the intermittent d.c. delivered from the control rectifier is superimposed; variations in the d.c. component regulate the supply of current to the furnace. The advantage of this system is that with a single-anode rectifier both a.c. half-waves can be utilised, and that by the choice of a suitable ratio for the choke, the voltage used with the hot-cathode rectifier can be increased so that its anode current is correspondingly decreased.



Temperature control with chopper-bar system, a, and reflex-coupling, f; the double-grid vacuum tube, c, regulates the current to furnace, b, and the amplitude bridge, e, is controlled by the ring tube, d

The various systems described in this article have been applied to automatic temperature control of pull-through fur-

* "Variation factor" has been defined as the range over which the temperature of a furnace (controlled by a regulator with "rigid" reflex-coupling) fluctuates between the limits of load control.

naces for hardening and annealing at temperatures up to 1,200 deg. C., but any other type of electric furnace can be similarly equipped. Furthermore, the temperature can be controlled according to a definite programme by a special instrument which controls one of the resistances at pre-set time intervals.

The use of vacuum-tube regulation is not limited to resistance furnaces. As inverted rectifiers (a.c. from d.c.) vacuum tubes have been employed to feed induction furnaces, and in this application (principally on account of the ease and accuracy of control) they are threatening to displace rotating machinery. As the induction furnace has an extremely poor power factor (approx. 0.1) the mains are generally relieved of the wattless component by the use of parallel condensers. The power factor of an induction furnace fluctuates during operation as the result of variations in the state and nature of the charge (magnetic change point), so that with rotating plant operating at fixed frequency, frequent switching operations at the condenser battery are needed. With the inverted rectifier, it is only necessary slightly to retune the control circuit in order to maintain the power factor constant at 1.0.

The efficiency of an inverted rectifier is higher than that of a high-frequency machine. The most favourable frequency drops, however, as the size of the furnace and its charge increases, due to the greater penetrating powers of the lower frequencies into large masses of metal.

Thus the application of the inverted rectifier in this instance is governed by the available glass bulbs. With steel-tank rectifiers the induction losses in the walls of the rectifier vessel are very high on account of the intermittent nature of the arc. Small induction furnaces can be fed from ordinary high-vacuum radio transmitter tubes.

Flameproof Electrical Apparatus

New official certifications

THE following is a list of apparatus for which the Mines Department issued certificates of flameproof enclosure during the period January 1st to June 30th. The last list was published in our issue of January 19th last :—

Anderson, Boyes & Co., Ltd.—"Universal" coalcutter motor and star-delta starter in separate enclosures, 40 h.p., 400/650 V, with interlocked 100-A B.S. plug and socket, or remote control switch in substitution for starter with interlocked pilot contacts in plug.

B.E.A.M.A.—Transformer tank, alteration to skids and type of welds.

British Thomson-Houston Co., Ltd.—Type "R" large, medium, and small slip-ring enclosure and size 12,059 MF slip-ring motor. Type MU80 air-break gate-end switch. Terminal box for alternative cable fittings.

Crompton Parkinson, Ltd.—Motors ⅓ or ½ h.p., 250 V, d.c., or single-phase r.s.i. interior, or three-phase s.c.i. interior up to 440 V. Also slip-ring enclosure up to 100 A at 450 V with brush lifting gear.

Electrical Apparatus Co., Ltd.—Size "RO" drum controller up to 30 h.p. at 650 V. Size 1 type "ATB" air-break circuit-breaker up to 300 A at 650 V a.c., interlocked isolators top and bottom, stop push, optional meters and external fittings. Types "AT," "AB," "A," "A.D.T.B.," "ADT," and "AD" are similar except in the dimensions and isolator arrangement. Also a 100-A B.S. plug and socket up to 660 V with pilot contacts for interlock. Type "R06FZ" haulage control panel, drum, contactor, and isolator, hand-operated or automatic, d.c. or a.c. up to 150 A at 650 V. Type "V" automatic air-break gate-end switch up to 100 A at 650 V.

Electrical Power Engineering Co. (Birmingham), Ltd.—Motors, ½ h.p., type DF4 d.c. and single-phase repulsion start for 500 V, and type AF3 squirrel-cage three-phase and two-phase for 550 V.

George Ellison, Ltd.—Type B air-break gate-end circuit-breaker with reversing switch, isolators, and cable link boxes, up to 100 A at 650 V d.c. or a.c. Also busbar chamber for coupling type B to multi-panel board. No. 1 four-way cable-end coupling for 60 A at 660 V, two-, three-, or four-core armoured cables.

English Electric Co., Ltd.—Type A oil-immersed stator reversing contactor switch, 150 A at 3,300 V, in two compartments on a pedestal.

Ferranti, Ltd.—Three-phase transformer tanks, 2 kVA at 3,000 V and 3 kVA at 650 V.

Wilfrid Francis & Co., Ltd.—Size 2 combined controller and resistance unit for 30 h.p. at 400/650 V with 8-point a.c. or 6-point d.c. interior and isolator. Size 1 similar, except in the dimensions, and another similar for 50 h.p. Automatic gate-end control panel for 50 h.p. at 400/650 V three-phase, with internal isolator and plug-in busbar connections for remote control as multi-panel board with earth continuity protection. Another similar, but with separate busbar chamber containing isolating switch.

General Electric Co., Ltd.—Auto-switching plug and socket connector, 6 A at 110 V single-phase, spring-loaded two-stage operation. Switch and transformer unit, 4 kVA single-phase, 3,300 V input and 110 V output, comprising air-cooled dry transformer with isolator and h.v. fuses in tank on skids with l.v. switch and fuse unit mounted on rear. Type "X6076" three-pole 30 A 500 V switch and fuse box. Type "SR71" vertical spindle petrol pump motor, ¼ h.p. 220 V single-phase 25 cycle, with internal switch.

Horace Green & Co., Ltd.—Three-phase squirrel-cage induction motors, 100/500 V, 5, 7.5, and 10 h.p.

Harland Engineering Co., Ltd.—Squirrel-cage induction motor with inspection covers in place of venting devices.

Heyes & Co., Ltd.—Indicator lamp fitting for signalling circuits up to 12 W at 25 V.

Holophane, Ltd.—Type F618 bulkhead lighting fitting for 100-W lamps.

Austin Hopkinson.—"Black Star Major" coal-cutting machine, 45 h.p. 660 V d.c. with cable duct between motor and reversing starter enclosures and interlocked B.S. plug.

Lancashire Dynamo & Crypto, Ltd.—Petrol pump motors, a.c. and d.c., ¼ to ¾ h.p., 50 to 250 V with and without internal switch. Four sizes of three-phase "Fankuld Maxtorq" induction motors.

Laurence, Scott & Electromotors, Ltd.—Type GE20 air-break gate-end switch and transformer unit of 1 h.p., 440-V input and 110-V output, with interlocked plug and isolator. Range of squirrel-cage motors, 7.5 to 20 h.p. 110/650 V, with combined starter, or terminal box or interlocked plug. Slip-ring enclosure and range of slip-ring motors in four sizes.

Macintosh Cable Co., Ltd.—Cable-end connector, compound-filled tee and coupling boxes, with "Tufnol" mouldings in place of plates.

Mavor & Coulson, Ltd.—Squirrel-cage induction motor and air-break reversing starter separately or combined in one enclosure for driving conveyor, 5 to 20 h.p. 400/500 V three-phase.

Metropolitan-Vickers Electrical Co., Ltd.—Oil-immersed circuit-breaker of 125 h.p., direct starting switch, or star-delta starter with combined terminal and cable sealing boxes, 125 A at 600 V a.c. Also transformer tanks with alteration to skids and type of welds.

Morley Engineering Co., Ltd.—Combined d.c. motor and air-break drum-type reversing controller, 10 h.p. at 500 V.

Bruce Peebles & Co., Ltd.—Squirrel-cage conveyor motor, three-phase 15 h.p. 650 V, with terminal box or interlocked B.S. plug.

A. Reyrolle & Co., Ltd.—Lighting transformer unit, compound-filled, with primary and secondary fuses and three-pole air-break circuit-breaker, 2.5 kVA at 3,300 V input and 125 V output, for use in substitution of potential transformer in association with drawout pillar switchgear. Flush-mounting meter enclosure for back mounting. Joint-box lighting transformer, compound filled, with secondary terminal box and primary and secondary fuses, 1-kVA at 400/3,000 V input and 110-V output, secondary mid-voltage point connected to tank internally. Extension of Flp. 19 and 42, variation of cable-coupler and plug body material. Variation of Flp. 88, meter and relay enclosures. Flit plug connector, 15 A at 660 V.

Wm. Sanders & Co.—Air-break double-pole switch and fuse box, 30 A at 500 V.

Simplex Electric Co., Ltd.—Wellglass-type lighting fittings for 40/60- and 100-W lamps.

J. G. Statter & Co., Ltd.—Double-pole air-break circuit-breaker, 500 A at 650 V, with compound-filled terminal boxes, d.p. for two-wire d.c. and t.p. for three-phase.

Sunderland Forge & Engineering Co., Ltd.—100 A B.S. plug and socket for 66 V with pilot contacts for interlocks.

Switchgear & Cowans, Ltd.—100-A 660-V plug and socket with pilot contacts for interlocks, reversible interior and alternative adaptors.

Veritys, Ltd.—Wellglass-type lighting fitting for 100-W lamp, conduit junction box connected to terminal chamber.

Walsall Conduits, Ltd.—Wellglass-type lighting fittings for 100/150-W lamp with reflector body, alternative cast-metal or wire guard. Bulkhead and wellglass 60-W lighting fittings.

Whipp & Bourne, Ltd.—Three-phase 200-A 650-V three-pole air-break circuit-breaker.

"Model Engineer" Exhibition

The sixteenth annual "Model Engineer" exhibition will be held at the Royal Horticultural Hall, Westminster, from September 6th to 15th. There will be a big display of working models by members of the Society of Model and Experimental Engineers and other clubs; a trade section with a comprehensive show of lathes, light machine tools, workshop equipment, and electrical and scientific apparatus; and a competition section in which numerous cups, medals, and other prizes are offered, including a special cup presented by Admiral Sir Reginald Bacon, K.C.B., for the best piece of amateur mechanical work. A passenger-carrying railway track will also be in operation. The organisers are Percival Marshall & Co., Ltd., 13-16, Fisher Street, W.C.1.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

In the Winter Time?

May I beg a small amount of your space to put to your readers a request for assistance in a matter in which some of them may have had more experience than we have had?

I am managing a small provincial firm dealing in electrical goods of all kinds and radio apparatus. I have three or four speciality salesman permanently attached to the firm, who have during the summer been selling a first-grade refrigerator with considerable success. In spite of what the manufacturers may say, however, there is no doubt that the refrigerator season will end abruptly some time towards the end of August. My problem, therefore, is what are these men to sell during the winter, bearing in mind that the article should, if possible, be capable of being demonstrated in the customer's own home (this has been done in the case of refrigerators). It must be an article representing approximately the same turnover per sale—the average price of the refrigerator is £55—preferably made by a well-known manufacturer, and requiring as little unremunerative service as possible.

What shall I concentrate upon during the winter months? Our business is situated in Berkshire, in what might be termed an average upper middle class district. E. B.

July 21st, 1934.

The Fuel Returns

Mr. A. J. Howard, of Taunton, in a letter in your issue of July 20th says that in the case of Salisbury Company the units generated by water power may have a very material effect on the working efficiency of the station.

In view of the fact that our units generated by water power in 1933 were only 1.6 per cent. of the total, I think that most engineers would agree with me that this small amount of water units had very little effect indeed on the steam results.

Probably if the water units had been generated by steam the steam results would have been slightly better, but the difference would, no doubt, have been so small as to be negligible.

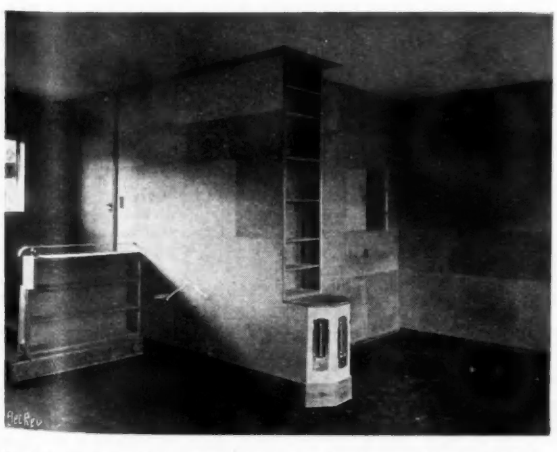
It is not desired to comment on the Taunton results, but in Salisbury we do not agree as to the moral victory of Taunton suggested by my friend Mr. Howard.

A. B. RANDALL, *Engineer and Manager*,
Salisbury Electric Light & Supply Co., Ltd.

Salisbury, *July 20th*.

The Loading of A.c. Motors

With reference to the article on "The Loading of A.C. Motors," by Mr. J. V. Brittain, which appeared in your issue of July 6th, I was particularly interested in figure 1, showing efficiency and power factor curves of a 730-r.p.m. induction motor plotted against load. The author did not specifically



In this house, designed by Mr. P. D. Hepworth, F.R.I.B.A., three 1-kW Revo "Futura" fires are mounted in a buttress—rather a novel system

mention the size of motor to which these curves related, but from the general context I take it that a medium-sized wound-rotor motor of about 100 h.p. is what he has in mind as producing these results.

In this figure efficiencies ranging from 89 per cent. at ¼ load to 97.5 per cent. at full load are shown. These efficiencies would appear to be remarkably high for a medium-sized wound-rotor machine, and I had thought that any 100-h.p. four-pole motor able to show comparable efficiency figures would be regarded as considerably above the average, and that even a squirrel-cage medium-sized motor with a specially low resistance rotor, ball bearings, and minimum air gap, could not possibly hope to approach within 5 per cent. of the efficiency shown. I am afraid, however, I shall have to revise my ideas on the subject. Perhaps, if he is not giving away design secrets, Mr. Brittain could say how this desirable result has been achieved in the motor to which he refers, whether by cutting down the stator and rotor copper losses by some means

The new showroom of the Kettering U.D.C. Electricity Department at Market Harborough **(See page 126)**

to a value below normal, or by reducing the iron losses by the use of some special alloy or special design of core plates.

July 20th. "ELECTRON."

Wash-boilers

Referring to the article on "Wash-boilers" by a "Consumers' Engineer" in your issue of July 20th, we would like to comment on the matter of the position of the control switches.

It is found that to fit two foot-press switches to the wash-boiler and then plug in to a 15-A socket definitely costs less. The socket into which the wash-boiler is plugged is more often than not already available on a cooker control board, and that is why so many of the latter units are being supplied with 15-A secondary circuits.

You will readily appreciate that by plugging in to an existing cooker unit no special wiring is required, and this, in conjunction with fitting foot-press switches on the wash-boiler, must result in lower installation costs.

"M.K." ELECTRIC, LTD.,
A. E. Mills, *Sales Manager*.

Edmonton, N.18, *July 20th*.

Circuit-breakers and Fuses

In his article on "Factory Switchgear" which appeared in your issue of July 13th, Mr. J. O. Knowles compared a short-circuit test on a 500-A fuse with one on a 1,500-A standard circuit breaker.

The deductions that might be drawn from fig. 2 are likely to be misleading in regard to the relative speeds of operation of fuses and circuit breakers when of comparable rating. A 550-A circuit breaker if of first-class quality (but not otherwise) would clear the fault in about 0.025 sec. against 0.029 sec. given for the fuse. The parts of a 1,500-A circuit breaker are naturally heavier than those of a smaller breaker and are designed primarily with a view to making good contact between the brush and the stationary contact.

If the 500-A fuse is backed up by a circuit breaker of greater capacity, it is reasonable to expect the smaller protective unit to operate without bringing out the larger one, which may control other supplies.

What would happen if the 500-A fuse were backed by a 1,500-A fuse? J. G. STATTER & Co., LTD.,

London, S.W.1, *July 23rd*. J. G. Statter, *Director*.

A Static "Voltage Relay." By J. C. Costello

IT is well known that the resistance of an ordinary tungsten lamp varies markedly in accordance with the voltage impressed on it. It is not, however, quite so generally known that the variation follows very closely the simple law represented by the equation $R_v = R_n\{a + (1-a)\sqrt{V/V_n}\}$ where R_v is the resistance with voltage V impressed, R_n the resistance at normal voltage V_n and a is a constant. The value of R_n is of course given by V_n^2/W, where W is the rating in watts of the lamp. The value of the constant a varies somewhat, though very little, with different lamps. In general it is between 0.11 and 0.13, but even for departures of 50 per cent. from the normal voltage it makes very little difference which value is taken. A value of 0.125 may serve for all practical purposes and the above equation then becomes $R_v = R_n(0.125 + 0.875\sqrt{V/V_n})$.

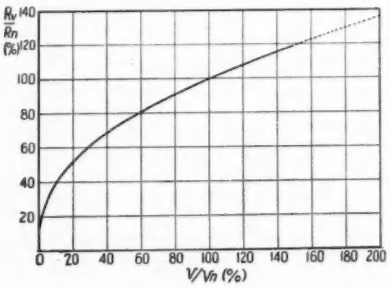


Fig. 1

This definite non-linear resistance-voltage characteristic has several possible applications, one of which has been found useful by the author. In the course of some experimental work it was found necessary to have an operating voltage *proportional to the percentage deviation from normal of the supply voltage* and the circuit of fig. 2 was utilised to provide this. In this figure T, T, are tungsten lamps; R_o, R_o, ordinary wire-wound ohmic resistances; V is the supply voltage (of normal value V_n), and V_e the effective voltage obtained from the relay. The value of the ohmic resistances R_o is equal to the resistance R_n of the lamps at normal voltage. The voltage V across either lamp equals $V\frac{R_v}{R_o+R_v}$, and the output voltage V_e equals $V\frac{R_o-R_v}{R_o+R_v}$.

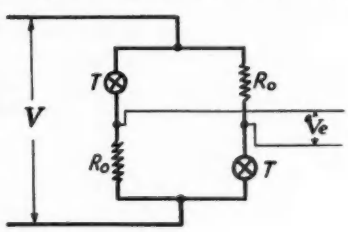


Fig. 2

At normal voltage V_e is zero; as V increases or decreases V_e also increases in linear proportion to the change in V. If the supply voltage is d.c., or if the circuit is fed through rectifiers as shown in fig. 3, the direction of V_e will be reversed according as the voltage V is above or below normal. This may be desirable in some applications.

The characteristic curve of the circuit for a range of V from $0.5\ V_n$ to $1.5\ V_n$ is given in fig. 4, which curve is almost perfectly linear over a considerable range, and is symmetrical over a range of about 15 per cent. The voltage V_e is independent of the absolute values of the resistances used; any convenient lamps and resistances may therefore be used provided that the latter can be varied so as to obtain balance at normal voltage.

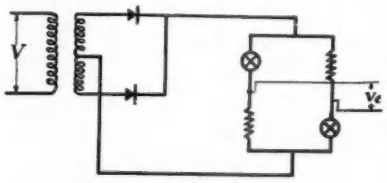


Fig. 3

The curve in fig. 4 has been obtained experimentally. It can, however, be calculated by using the above relation. Thus substituting $V_n/2$ for V_n in the second equation and for convenience taking V_n equal to unity, the voltage across the lamp is

$$V_T = \frac{R_T}{R_o R_T} = V_1 \frac{.125 + .1237\sqrt{V_T}}{1.125 + .1237\sqrt{V_T}}$$

This equation is a cubic in V_T and is therefore rather troublesome to solve. However, a few points were calculated and found to agree closely with the directly obtained curve.

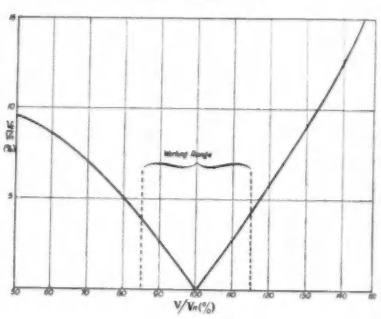


Fig. 4

New Books

Commercial Engineering. By JAMES BACON, M.B.E., A.M.Inst. C.E. Pp. 288. London: Crosby Lockwood & Son. Price 6s. net.

It is commonly complained of engineers that they are so immersed in the technicalities of their profession that they are prone to neglect the commercial side, which is of increasing importance. The author's aim in this book is to redress the balance by imparting an essentially practical knowledge of commercial and economic matters.

The seventeen chapters into which the work is divided cover a wide range, and include such matters as selling, organisation, estimating, advertising, trade and markets, taxation and insurance, the formation of companies and patents.

Naturally in such a small compass the treatment of each subject is not exhaustive, but the matter is such as to make the work an excellent "primer" for the purely technical man.

Power Supply Economics. By J. D. JUSTIN and W. G. MERVINE. Pp. XIII+276; figs. 58. London: Chapman & Hall, Ltd. Price: 21s. 6d.

This is the best book on power station economics that has come our way. Even allowing for the difference between British and American practice, and the allocation of more than a quarter of the book to water-power plant, what remains is still a very valuable contribution to the problem as it occurs here. Much of the ground covered is now (in this country) the business of one body only—the Central Electricity Board—but there are a number of local problems in which the book will be of service to supply undertakings. It is also an excellent guide for the factory manager on the question whether to purchase power or to generate it, and, in the latter case, what type of plant to install.

The book commences with a short historical sketch of the growth of power, which is followed by an excellent chapter on load predictions and expenditure planning. A chapter on fuels has only local application, but subsequent chapters deal clearly and helpfully with load and diversity factors, operation economics and analysed costs of steam electric power. Five chapters on hydro stations are followed by two very good chapters on peak-load plants and interconnection. The three remaining chapters are directed largely to the power user, and deal with oil-engine plants, industrial power plants, and the purchase of power.

The last chapter is, on the whole, the weakest in the book. It is the only one which deals at all with tariffs for power supplies, and this only in the first few paragraphs. Since, according to the authors, about half the electric power used in American factories is purchased from outside, the price paid for it cannot be adequately treated in this space. Such an important aspect as that of power-factor penalties is dismissed in a couple of sentences. The arrangement also is occasionally open to criticism where general principles and data are treated under particular heads; thus, obsolescence and sinking-funds tables occur in Chapter X under the heading "Cost of Hydro-electric Power."

There appear to be very few situations so favourably placed that hydro stations can economically supply the whole power; in all other cases the requirements can best be met by interconnected steam and hydro stations, the former usually supplying the bulk of the power. It is suggested that peak-load hydro plants will be much commoner than at present. In an emergency a hydro unit can go from standstill to full load in one to three minutes, whereas a large turbine takes an hour or more from cold even with boilers hot.

* * *

Shorter Notices

"Centrifugal Pumps, Turbines and Propellers," By W. Spannhake. Pp. 328; figs. 182. Cambridge, Mass.: Technology Press, $5. This is a translation by Mr. J. B. Drisco of the author's German treatise on the fluid mechanics of rotary hydraulic machinery as applied to an analysis of pump and turbine operation. The treatment is mathematical, but should help towards giving a clearer understanding of the behaviour of fluids under practical conditions.

"Electronic Structure and Properties of Matter," by C. H. Douglas Clark. Pp. 374, figs. 33. "Thermionic Emission," by A. L. Reimann. Pp. 324; figs. 64. London: Chapman & Hall, Ltd. Price: 21s. each.

"Logarithms—Numerical and Graphical," by N. R. Corke. Pp. 79; figs. 33. London: Gee & Co. (Publishers), Ltd. Price: 8s. 6d.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Geared Motor Units

A new range of geared electric motors for continuous operation is being produced by MESSRS. HIGGS MOTORS, LIMITED, Witton, Birmingham, 6, in units each consisting of either a squirrel-cage, repulsion-start-induction or a d.c. motor flange-mounted and coupled to a totally enclosed gear-box having a double or triple reduction.

The spur-gear wheels run in oil. The low-speed shaft is held between oversize ball bearings. All gear wheels, with the exception of the high-speed motor pinion and its corresponding spur wheel, run between two bearings. The oil-flingers and glands fitted to both motor and output shafts are designed with a view to eliminating risk of oil leakages. The casing of fine-grained cast iron has no split joint on the outside or between the feet. The only joint in the casing is sealed by a deep circular spigot. Oil filling and draining plugs are fitted to the unit, and there is also an indicator to show the oil level.

A Higgs geared motor unit

The maximum size of motor is 1 b.h.p. at 1,425 r.p.m., with a reduction to 28 r.p.m.; for smaller outputs a motor of lower speed may be fitted, with a corresponding reduction in the final shaft speed.

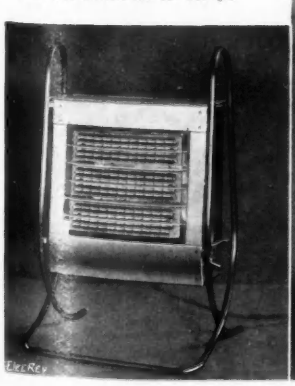
A.c. Switchboard Instruments

A new range of a.c. switchboard instruments has been developed by MESSRS. A. REYROLLE CO., LTD., Hebburn-on-Tyne. All are of the moving-iron spring controlled type, and are of first-grade accuracy. Types "AM8" (projecting) and "AF8" (flush mounting) have an 8-in. scale and an 8-in. dial. The spindle carrying the moving-iron is fitted with hardened steel pivots operating in jewelled bearings and can be readily removed without upsetting the calibration of the instrument. In addition, the complete moving system has been designed so that it can be removed and put back in exactly the same position without risk of distortion by unequal tightening of screws. The pointer and damping piston are of aluminium, ensuring a high degree of damping and, therefore, easy reading.

The loading is about 2 VA for 5-A ammeters and 5 VA for 110-V voltmeters. All scales are clearly marked, and the large angular deflection allows the divisions to be made open over the whole range. Back terminals are provided as standard, but front connections can be obtained on the flush mounting instruments. All instruments are subjected to a 2,000-V a.c. test between the live parts and the case before despatch, and accuracy complies fully with British Standard Specification No. 89. These remarks apply also to types "KC5" and "KM5" industrial ammeters and voltmeters which have been designed, in the case of type "KC5," for mounting directly on the top of switch pillars or controllers, and type "KM5" for distribution switchboards. Five-inch dials and scales are provided.

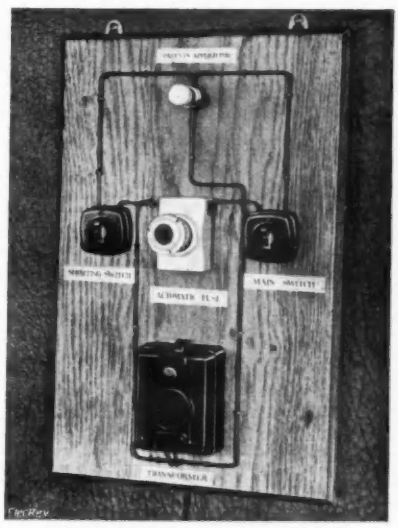
The flameproof patterns, "FS6" and "FF4" are designed respectively for direct fitting to a flameproof enclosure such as a mining type switch-pillar, and for flush mounting. The cases are of particularly robust construction and are designed to withstand an internal pressure of 50 lb. to the sq. in., and the glass is subject, before fitting, to a routine hydraulic pressure test at 50 lb. per sq. in. for five minutes to ensure that there shall be no flaws in the glass after the instrument has been despatched.

New Best & Lloyd developments: A 3-kW fire of modern design and a ceiling fitting to take three 60-W lamps



An Automatic Fuse

The automatic fuse introduced by MR. W. A. SMITH, 172 Buckingham Palace Road, London, is made for easy fitting on the ordinary fuse-board, and to operate at current as small as 0.2 A at from 2 to 550 V. When a fault occurs a small press-button is projected, giving immediate indication of the defective circuit, which is put into service again, if the fault is clear, by depressing the button. Should the button be held in the depressed position while a short-circuit exists the contacts of the associated switch can still separate.



The automatic fuse wired for demonstration purposes

The equipment includes a switch, the contacts of which are embedded in an insulating medium to extinguish the arc. The switch is biased by an opening spring, but is normally prevented from opening by the insulating material until this softens at a predetermined temperature.

Stop Watches

Two new models of fly-back stop watches for engineers and electrical workers are being introduced by Messrs. A. ARNOLD & CO., 122, St. John St., Clerkenwell Rd., E.C.1. The first (illustrated), giving readings to one-tenth of a second, has a minute recording dial and a large centre seconds hand. The case is finished in chromium, and has a front of unbreakable glass. The watch is operated by pressing the winding button down to start, again to stop, and a third time to return the hands to zero. The other new model has a dial graduated in fifths of a second and with a thirty-minute recording dial. The retail price of both patterns is 25s., and every watch is guaranteed for three years by the makers.

The Arnold stop watch

Dual-filament Lamps

An incandescent lamp that contains two separate filaments in one glass bulb is being distributed by the ALDWYCH LAMP CO., LTD., Aldwych House, W.C.2. The filaments are coaxial, of the coiled flat-ring type, supported one above the other by a single glass stem. The lamp cap has three contacts spaced 120 deg. apart, one being larger than the other two so that either pair may be bridged by the lampholder plungers.

Recessed in the side of the cap is a brass collar to which are attached the bayonet clip pins which secure it in the lampholder. By rotating the lamp in this collar a change-over from one pair of contacts to the other is effected, thus bringing the second filament into use when the first one has burnt out.

These lamps are obtainable at normal prices, voltages, and wattages, clear and gasfilled, in two types. One has two filaments of equal wattage, and the other, which is priced at 2s., has a 60-W filament and a smaller one that provides a

subdued night light. We are informed that these "double-life multiplex" lamps are being made in England.

Pole-type Sub-stations

A rural sub-station, constructed in unit form, which is designed for pole mounting and can be easily lowered to ground level, is being introduced by the BETTER LINES CO., Mile Oak, Tamworth, Staffs.

The "Twenty-five" unit, despite its trade designation, covers a range of capacities from 5 kVA single-phase, 6,600 and 11,000 V, to 75 kVA three-phase, with a standard transformer tank cover and a standard carrier, thus enabling the capacity to be changed within the above limits without making any alteration whatsoever apart from fuse capacities.

The sub-station consists essentially of a standard P.B. (Callender's) steel pole to the projecting cross-arms of which are attached high- and low-voltage pedestal insulators for making the line connections. The outdoor type transformer has h.v. fuses inside its bushings, on top of which are butt contacts with arcing horns. The fuses on the l.v. side, also of a standard cartridge type, are housed in a weather-proof compartment on the tank cover, which also has butt contacts on top.

The transformer is supported by four bolts in a steel frame carrier that moves on roller guides up and down the flanges of the pole, and is raised by a steel rope winch until contact is made with spring-loaded base plates on the pedestal line insulators fixed above. Contact is made first on the l.v. side and then, through the arcing horns, on the h.v. side. In the closed-circuit position retaining hooks relieve the winch rope of the weight of the transformer. A slight overwind automatically releases the hooks, so that the transformer can be lowered out of circuit, the load being broken on the arcing horns. All porcelain is in compression and cannot be subjected to a slamming action.

The double purchase lift is self-sustaining, requiring the minimum of effort and retaining the load in any position.

The "Twenty-five" pole-mounting sub-station unit. Below: The transformer in lowered position

Apart from simplicity of fuse renewal and transformer changing at ground level, an off-load circuit changing switch may be incorporated, while every arrangement of line or cable connection can be provided for.

Luminous Switch Indicators

CELGLO LUMINOUS SIGNS, 154, Clapham Park Road, S.W.4, inform us that their luminous switch indicators described in these columns a few months ago have been redesigned to allow a more brilliant and powerful radium compound giving greater luminosity to be used.

Turntable for Millinery Shops

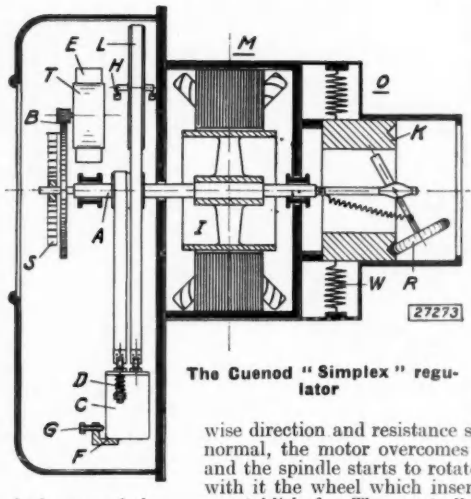
THE S.F.P. ELECTRICAL CO., Banbury, has recently produced a special compact and inexpensive turntable for hat stands in millinery shops. It will carry up to 10 lb., runs for 100 hours on one kWh of electricity, and costs 32s. 6d. The table revolves at 3 r.p.m. and is fitted with ball thrust bearings throughout. In addition to this model, turntables for larger displays are also available.

An Automatic Regulator

The PIGGOTT ELECTRICAL CO., LTD., Salisbury Square House, London, E.C.4, is introducing to Great Britain the "Simplex" regulator (developed by the H. Cuenod Works Co., Geneva). This apparatus is designed to regulate the power factor or frequency of electrical machines and to control motors for rolling mills, winders and paper mills by variation of exciting current. It comprises three distinct devices for measurement, regulation, and control; the first actuates the second without the aid of auxiliary energy.

The measuring device (M) is a Ferraris motor, fed from the circuit to be regulated, and exerting torque that is balanced by a counter weight (C) with the rotor (I) in any position. The counterweight rests on knife edges (H) of the balance (L). The spindle (A) of the motor operates the regulating device (O), comprising a small carbon wheel (R) which moves without friction over a fixed commutator (K), the segments of which are connected to the steps of the regulating resistance (W).

The spindle also drives, through a spiral spring (S) and a train of gear wheels (B), a drum (T) which revolves in the field of the permanent magnets (E), providing a controlled time-lag. The rotor is fitted with spring stops at the ends of its travel, and the counterweight is suspended on springs (D), resting at the lower end of its travel on stops (F), which are solid with the case, so that sudden failure of motor torque involves no shock to the spindle or the counterweight suspension. Screws (G) hold the counterweight rigidly to the case for transit.



The Cuenod "Simplex" regulator

If the current or voltage regulated falls below normal, the action of the counterweight preponderates, so that the spindle together with the wheel rotate in an anti-clockwise direction and resistance steps are cut out, but if it exceeds normal, the motor overcomes the effect of the counterweight, and the spindle starts to rotate in a clockwise direction, taking with it the wheel which inserts resistance until equilibrium is re-established. The controlled time-lag device matches the speed of regulation of the apparatus to the time of response of the machine being regulated in order to avoid "hunting." The spindle transmits its action to the spring, which tends to rotate the drum in the magnetic field; the eddy-currents in the drum resist its further movement. Movements of the spindle can thus be delayed by an amount that may be regulated by the gap of the magnets and by the constant of the spring; the faster the drum and the spindle tend to turn, *i.e.*, the larger the variation of the regulated quantity from normal, the greater is the effect of the time-lag mechanism.

The limits between which the regulator does not operate are of the order of 0.5 per cent. above and below normal; and its speed of action is definitely proportional to the variation to be corrected. Its "characteristic period of operation" (*i.e.*, the time taken in completing the travel of the regulator, multiplied by the percentage variation, but without time lag) is about 0.05 sec.

Flameproof Lighting Fittings

Lighting fittings which are designed to meet the tests of the Mines Department Testing Station, Buxton, and have passed the test, certificate No. F.L.P. 169, for use in inflammable atmospheres containing firedamp (methane), petroleum vapour, and acetone vapour, are being made by VERITYS, LTD., Plume and Victoria Works, Aston, Birmingham, 6.

They comply with the definition of flameproof enclosures in British Standard Specification No. 229/1929, under the conditions described in the test report, and are supplied with or without the conduit boxes but it is necessary, if the conduit box is in the same atmosphere, that it should be of the flameproof type as illustrated.

All the glasses are tested by hydraulic pressure from 50 to 70 lb. per sq. in. before cementing into the fittings. To ensure strong glasses being supplied, the glasses for replacement are

The new Verity flameproof fittings

only supplied with the attachment ring, the fixing of which is such that it must be attached properly, otherwise the fitting will not close. The fittings are of cast-iron of substantial thickness to withstand an internal explosion and are large enough in area to keep the surface temperature low.

In the Courts

IN a Divisional Court of King's Bench on July 19th, before the Lord Chief Justice and Justices Avory and Mackinnon, the case of the King *v.* the Kingston Justices (*ex parte* the Walton and Weybridge Urban District Council) was heard upon arguments on a rule *nisi* granted by the Court for a mandamus calling upon the justices to show cause why they should not state a case in a matter which was before them on October 11th, 1933, under the Factory and Workshop Acts.

The proceedings before the justices were taken by Mr. A. C. Margetts, an Inspector of Factories, against the Walton and Weybridge U.D.C. as the owner of the electrical undertaking of the district in respect of an accident to a man named James O'Halloran. It was alleged that equipment at the Arch Road outdoor sub-station, Hersham, was not insulated, and further efficiently protected where necessary to prevent damage so far as was reasonably practicable. It was given in evidence before the justices that while O'Halloran was working at the sub-station he was very badly burnt because he came in contact with a 6,000-V conductor.

The case for the prosecution was that the place was a "factory and workshop" because it was one of the stations referred to in the Schedules of the Act of 1901 which defined electrical stations. The respondents, the U.D.C., relied upon exemption of the regulations, which said "nothing in these regulations shall apply to any service lines or apparatus on the supply side of the consumers' terminals or to any chamber containing such service lines or apparatus where the supply is given from outside of the consumers' terminals or to any chamber containing such service lines or apparatus where the supply is given from outside under Board of Trade Regulations, provided always that no live metal is exposed so that it may be touched."

The Kingston Justices held that the prosecution had made out no case against respondents either in fact or law, and stated that they considered the application was frivolous. On February 8th last the Divisional Court granted a rule *nisi* for a mandamus calling upon the justices to show cause why they should not state a case in the matter for the opinion of the High Court, and the question now before the Court was whether the rule should be made absolute or discharged.

The Lord Chief Justice, in delivering judgment, said: "I am not prepared to say that there is no evidence on which the justices could come to the conclusion they did. Therefore, the rule will be discharged." The other members of the Court concurred.

Radio Rentals, Ltd., Granted an Injunction

In the Chancery Division last week Mr. Justice Clauson had before him an action brought by Radio Rentals, Ltd., Regent St., W., for an injunction to restrain the defendants Rentals, Ltd., Oxford St., W., from trading in the hire or hire-purchase of wireless receiving sets under the style of Rentals, Ltd., or under any style so nearly resembling the plaintiffs' trading style, Radio Rentals, Ltd., so as to be calculated to deceive. The plaintiffs also claimed an injunction to restrain the defendants from passing off their business or goods as and for those of the plaintiffs and also to restrain defendants from infringing plaintiff's copyright in certain forms of hire and guarantee and designs used by plaintiffs in their business. Damages were also claimed. After hearing the evidence his Lordship granted the plaintiffs an injunction and awarded the plaintiffs 30 guineas damages and costs.

Thermostat Patent Action

In the Court of Session, Edinburgh, on July 18th, Lord Pitman gave judgment in an action by the Rheostatic Co., Ltd., Slough, against Robert Maclaren & Co., Ltd., of Glasgow. Plaintiffs are owners of letters patent No. 305077 of 1927 for improvements in and connected with thermostats granted to Leonard Satchwell, Slough, of British nationality. The thermostat with which this case dealt was one which operated by the opening and closing of an electric circuit. The respondents are also manufacturers of thermostats of a similar kind, which they call the A.C.M., which was said by the plaintiffs to be an infringement of the Satchwell letters patent, and the plaintiffs, therefore, asked in the summons that the respondents should be interdicted from manufacturing, disposing, or selling without their consent thermostats which embodied the improvements described in the Satchwell specifications, or which were substantially the same. They also claimed damages of £2,000, but it had been arranged between the parties that the question of damages should stand over until the respective rights of the plaintiffs and respondents had been determined. Lord Pitman said there was no difference in the principle upon which the A.C.M. thermostat worked when compared with Satchwell's, and it followed that the plaintiffs were entitled to interdict. His Lordship said that Mr. Satchwell, who was examined as a witness, gave an account of how he came to design the Satchwell thermostat and to take out a patent therefor. The engineer responsible for the A.C.M. thermostat was a Mr. Richmond, a partner of the respondent's firm, who stated that the A.C.M. thermostat was invented by himself, working along with Colonel Maclaren, a partner of the firm. He stated that the firm were developing their thermostat "one from the other all the way through," and that he never bothered his head whether any other body had got a patent or not. The respondents had applied for a patent for the A.C.M. thermostat. The application was opposed by the plaintiffs and was at present under consideration. The respondents admitted that they had been manufacturing and selling the A.C.M. thermostat without the plaintiffs' consent. They denied, however, that it was an infringement, but, in any event, they alleged that the letters patent granted to Satchwell were invalid. On the question of the alleged infringement his Lordship said that Mr. Richmond was working on his own. The A.C.M. was what he achieved. If it was to all intents and purposes identical with Satchwell's, as it seemed to be, then it was an infringement whether he knew of the plaintiff's thermostat or not.

Liability for Compensation

An action brought by Messrs. Thistlethwaite & Edgar, electrical engineers, St. Annes-on-Sea, Lancs, against the Playshoe Co., Ltd., at the same town, claiming to be indemnified by the defendants for compensation which they (the plaintiffs) had to pay to one of their employés came before the Court of Appeal consisting of Lords Justices Scrutton, Greer and Slesser on July 20th, upon the appeal of the defendants from the judgment of Mr. Justice Swift at the Manchester Assizes holding that the plaintiffs were so entitled.

The facts were that the plaintiffs were on February 7th last engaged on electrical installation work at the premises of the defendant company and a man named Peter Moorfield, one of the plaintiffs' workmen, was attending to electric cables there when he was caught by a revolving shaft and badly injured. Under the Workmen's Compensation Act Moorfield became entitled to 30s. a week compensation from February 10th, the date of the accident, which plaintiffs paid him. Their case was that they were entitled to be indemnified by the defendants for these payments, alleging that defendants had been negligent in not properly guarding their machinery.

The defendants denied that they had been negligent and contended that there was no liability upon them.

At the conclusion of the arguments by Counsel the Lords Justices affirmed the judgment of Mr. Justice Swift and dismissed the appeal with costs.

Standard Switchgear, Ltd.

In the Chancery Division on Tuesday, Mr. Justice Bennett had before him a motion in a dispute with regard to the control of Standard Switchgear, Ltd., a private company, of Ardleigh Green, Hornchurch, Essex. Pending the hearing of an action, J. B. Rudkin, of Hillview Road, Rayleigh, applied for an injunction to restrain J. A. Collis and C. G. Collis from acting as directors, Barclay's Nominees (Branches), Ltd., being also defendants, whom the plaintiff asked should be restrained from exercising voting power in respect of certain shares.

Mr. A. Grant, K.C., for the plaintiff, said that plaintiff was managing director and A. G. Collis was the technical director of the company. In February, 1934, they each held an equal number of shares in the company, but Mr. Rudkin had control by virtue of 100 shares held by his wife. The difficulty arose in connection with 500 shares allotted to Barclay's Nominees (Branches), Ltd. The plaintiff's case was that they were nominees of A. G. Collis and that after the allotment a meeting of the company was held and that the sons of Mr. A. G. Collis were appointed as directors of the company in spite of Mr. Rudkin's protest.

Mr. Turnbull, for the Collises, said that if the plaintiff would co-operate with Mr. A. G. Collis in the management of the business he would undertake that until the trial of the action J. A. and Cyril G. Collis would not act as directors.

Mr. Grant: I have offered that.

Barclay's Nominees (Branches), Ltd., also, through their counsel, gave an undertaking until the trial that they would not exercise voting rights in respect of the shares in question.

No order was made on the motion, but arrangements were made for a speedy trial of the action.

Parliamentary News

(BY OUR SPECIAL REPORTER)

ON July 20th Sir R. Gower asked the Secretary of Mines if he could state the number of mechanical conveyors driven by electrical power and the number driven by compressed air, at or near the coal face during the three years ended 1933, respectively; whether compressed-air power for these conveyors was now less efficient than electrical power; and whether he was satisfied as regards the safety of the types that were driven by electrical power.

Mr. E. Brown said the numbers were as follows:—

MECHANICAL CONVEYORS IN USE BELOW-GROUND AT THE COAL FACE.

Year.	Driven by Electricity.	Compressed Air.
1931	1,476	1,661
1932	1,600	1,665
1933	1,878	1,839

Both types of drive were efficient, and the use of electricity for this and other purposes was limited and closely governed on grounds of safety by the provisions of the Coal Mines Act and of General Regulations.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Leyton's New Showrooms

A public supply for Leyton was first given in 1896, when the number of consumers was 110 and the sales of electricity during the first year totalled 123,797 kWh. The demand for supply has grown steadily, but the most marked increase has occurred during the past few years, and for the year ended March 31st last the consumption totalled 19,680,913 kWh. The domestic load has become one of increasing importance; showrooms have been opened at 280, High Road, and 368, Lea Bridge Road, Leyton. These have, however, proved inadequate to deal with this side of the Borough Electricity Department's business, and a third showroom has therefore been erected at 819, High Road, Leytonstone. This showroom, which was formally inaugurated on Saturday last by Mrs. A. J. Allanson, the Mayoress of Leyton, stands in a prominent position of the main thoroughfare and occupies a corner site. It has been planned on a far more ambitious scale than its predecessors and is of modern construction. There are large display windows on either side of the entrance, while the interior has panelled walls. The principal lighting of the interior is provided by concealed lighting in the ceiling and lay-lights, but there are also floor standards and wall fittings of various designs which can be switched on for demonstration purposes. Cookers, wash-boilers, fires, lampshades, and other smaller appliances have been arranged in the showroom with pleasing effect. The counter for the payment of consumers' accounts is situated at the rear of the showroom, while facilities are provided for the payment of the general rates, which should prove an excellent means of drawing attention of prospective consumers to the advantages of electricity in the home. On the floor above there is a large lecture hall, where periodical demonstrations of electric cookers and other appliances will be given, while the basement is used as a sub-station. The Electricity Department has hire and hire-purchase schemes, the latest being for the hire of electric cookers, under which consumers may have a cooker for a standing charge of 1d. per day, plus 1d. per kWh consumed, with a guaranteed minimum consumption of three kWh per day. The erection of the new showrooms has been carried out under the supervision of Mr. J. Wetherell, the borough electrical engineer and manager.

The new showrooms of the Leyton Electricity Department

A Glasgow Exhibition

A Housing and Health Exhibition is to be held in the Kelvin Hall, Glasgow, from October 3rd to 27th.

The Machinery Users' Association

In its report for the year ended March 31st last the General Council of the Machinery Users' Association, Inc., states that during the year a considerable addition has been made to the membership of the Association which now numbers upwards of ten thousand firms. The report also contains a review of the Association's activities during the year.

Employment During June

Employment in the engineering industry during June again showed an improvement in most sections, and in general engineering and electrical engineering it was a little better on the whole. According to statistics published in the *Ministry of Labour Gazette* the number of unemployed in the engineering industry totalled 132,632, a decrease of 5,841 as compared with the preceding month, the percentage falling from 14.5 to 13.9 (in June, 1933, the figure was 23.1 per cent.). In the electrical engineering section the number of unemployed was 7,219, the proportion falling from 9 to 8 per cent. (15.2 per cent. in June, 1933). In the electric cable, apparatus and lamp manufacturing group the number of unemployed was 11,475, the percentage falling from 10.3 to 9.1 (13.9 per cent. in June, 1933). Unemployment in the electrical wiring and contracting industry, however, showed a further slight increase, from 4,573 to 4,793, the percentage rising from 16.6 to 17.4 (17.8 in June, 1933).

Rotarians and the Electrical Trade

A meeting of Rotarians connected with the electrical industry was held at Douglas during the course of the recent annual conference of British Rotary. The chairman, W. J. Bache (Cheltenham) remarked that there was room for greater co-operation between the different sections of the electrical industry with a view to combating such undesirable features as bribery, improper discounts, ruinous competition, and trading by unqualified persons. He thought Rotary could make a definite contribution to the consideration of these problems, and he asked the meeting to consider whether Rotary representation in the associations governing the different sections of the industry was sufficiently strong at present to be effective and, if not, whether any steps could be taken to improve the position.

A full discussion ensued from which it transpired there was need for fuller representation of the industry in Rotary. A resolution was adopted that it was undesirable at present to institute any standing form of association of the Rotarians in the industry, but that a committee should be formed to explore the position further and to report to the Group meeting at next year's conference.

Irish Free State Electrical Imports

A slight decline occurred during May last in the imports of electrical machinery and cognate material into the Irish Free State, a value of £64,750 being attained as compared with £87,024 in the corresponding month a year ago. The appended table shows the imports during the first five months of the current and past years; as will be seen, the total shows a decrease of £25,116, this being more than accounted for by the reduced imports of radio sets and material.

	January–May. 1933.	1934.
	£	£
Electrical machinery	88,445	101,963
Electric wires and cables	30,670	39,958
Electric lighting accessories, fittings and parts ...	17,527	17,051
Radio sets and parts	94,209	50,655
Other electrical goods	82,935	79,043
Total	£313,786	£288,670

Works Visit

A large party representing the Ipswich Section of the Institute of Motor Trade were the guests of the General Electric Co., Ltd., on July 19th, at the Osram Works, Hammersmith. After lunch at the Clarendon Restaurant, presided over by Mr. C. Wilson, the party proceeded by coach to Wembley to inspect the new No. 7 Osram Lamp Factory and the research laboratories.

Recent Contracts

The Parsons Oil Engine Co., Ltd., has received an order from Messrs. John Brown & Co., Ltd., for two emergency dynamos for the new Cunard ship No. 534. These plants will be of 75-kW plus an overload, and comprise a standard pattern 8-cylinder Parsons kerosene engine, 7 in. bore, 8 in. stroke, standard speed 850 r.p.m., driving a B.T.-H. dynamo.

all mounted on a common bedplate. The order includes H. and F. coolers operated by their own electric motors.

Amongst recent contracts received, Messrs. J. Browett Lindley (1931), Ltd., have in hand a 180 b.h.p. compound condensing steam engine direct coupled to a 120-kW d.c. generator for supplying power at the works of the Watford and St. Albans Gas Co. Surface condensing plant, with motor-driven pumps is included, and the whole equipment is being supplied to the specification and under the supervision of Mr. T. C. Battersby, the manager and engineer.

British Insulated Cables, Ltd., has recently received an order to supply, lay and joint for the Midland Electric Corporation for Power Distribution, Ltd., a length of approximately 13,000 yd. of 33-kV cable. The company has also received an order from the United Provinces Hydro-Electric Division for 55 miles of 37-kV overhead line, from Sumera to Chandausi. Tubular steel poles will be employed for the straight-line work and the conductors will be of copper, with a continuous overhead earth wire of steel.

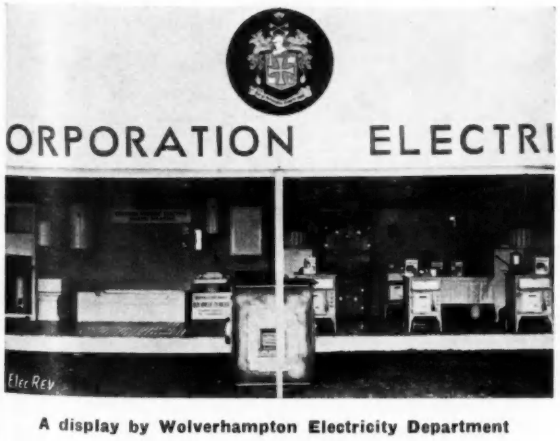
Recent contracts booked by the Switchgear & Equipment, Ltd., include the whole of the 110-kV and 33-kV switchgear for the New Zealand Public Works Department's Waitaki outdoor sub-stations, the 33-kV switchgear for Belfast Corporation's harbour extensions, switchgear for the Grampians scheme, a further repeat order for 33-kV fuse insulators for Palestine, and further orders for 33-kV switchgear for South Africa.

The Bournemouth Corporation has placed a further order with the Sunbeam Motor Car Co., Ltd., for six Sunbeam-B.T.-H. trolley buses, with bodies by Park Royal Coachworks, Ltd. These will be of the same type as the fleet of twelve six-wheel double-deck buses recently delivered. It is intended to replace all Bournemouth's tramcars with trolley buses during the next three years.

The British Thomson-Houston Co., Ltd., has recently obtained orders for a number of electric winding equipments for South Africa. These include two complete Ward Leonard equipments for the Union Corporation, Ltd., for installation at the Grootvlei Proprietary Mines, Ltd. One of these is a Rock Hoist and is driven by two motors having a normal speed of 64.8 r.p.m. giving a combined continuous output of 4,150 h.p. and capable of dealing with peak loads up to 9,000 h.p. The other equipment is for a Man Hoist and is driven by two motors having a combined output of 2,440 h.p. at 48.7 r.p.m. and capable of dealing with peak loads up to 6,160 h.p. Two Ilgner Ward Leonard equipments for installation at the East Rand Proprietary Mines, Ltd., are also on order. Each of these equipments includes a 2,876 h.p. hoist motor having a normal speed of 200 r.p.m. and capable of meeting frequent working peaks of 6,450 h.p. Power is obtained from a flywheel motor-generator set, the driving motor being a 2,200 h.p., 3,150 V, 25-cycle, 3-phase slip-ring induction type machine. Another order covers the supply of a Ward Leonard equipment for installation underground at Crown Mines, Ltd.

An Electrical Display at a Floral Fête

At a floral fête held last week at Wolverhampton, the Corporation Electricity Department had a comprehensive display of appliances illustrating the many uses of electricity for domestic purposes and in farming. The stand was divided into ten sections, and the two centre cubicles, shown in the accompanying illustration demonstrated the uses of electricity in the bathroom and in the kitchen. Mr. T. A. Margary, the



A display by Wolverhampton Electricity Department

borough electrical engineer, informs us that continuous demonstrations of all types of electrical apparatus were held and they aroused a considerable amount of interest amongst the general public.

Annual Holidays

The works of Santon, Ltd., will be partially closed from August 6th to 11th inclusive. Small and urgent orders will be dealt with, and a staff will be in attendance to deal with correspondence.

Messrs. Milne & Longbottom are closing down their works from August 18th to 26th inclusive. Urgent matters will be dealt with by a small staff.

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable-making Industry announces that there will be no "cost-of-living" alteration in wages paid in the industry on the third pay-day in August.

Foreign Operators of U.S. Companies

As an illustration of the difficulties under which American Corporations interested in foreign undertakings and trade have been operating in recent times we may quote from the *Electrical World* the experiences of the American and Foreign Power Company, one of the subsidiaries of the Electric Bond & Share Co. In the year 1933 it showed a decline in net income to $5,006,819, compared with $7,079,052 in 1932. Depreciation of foreign currencies in comparison with the dollar is cited as the "most important single factor" in the unfavourable results of operations of the company and its subsidiaries. Abnormal political conditions in Cuba and rate and exchange difficulties are mentioned. It is noteworthy that the gross income of the American & Foreign Power Co. in 1933 was $57,514,331 against $53,137,081 in 1932, but the operating expenses were $33,446,611 against $29,207,180.

A Cooker Tableau at Bourne

An Electrical Carnival Tableau

The accompanying illustration shows a large model "Revo" electric cooker which formed a tableau entered by the Mid-Lincolnshire Electricity Supply Co., Ltd., in the recent carnival procession held at Bourne.

Trade Announcements

Messrs. Scarborough, Mitchell & Co., electrical engineers and contractors, are removing their business from High Road, Whetstone, London, N., to 4, Friern Park, North Finchley, N.12 (telephone: Hillside 0863).

Messrs. Lionel Robinson & Co., Ltd., electrical distributors, have opened a new branch at 102, Abbey Street, Accrington, under the management of Mr. J. McGrath, and ask for manufacturers' catalogues.

The Vacuum Lamp Co., Ltd., has removed to 53, Great Eastern Street, E.C.2 (telephone: Bishopsgate 1962/3).

The Harland Engineering Co., Ltd., announce that their resident engineer (Mr. F. L. Parkin, B.Sc. (Eng.) has been placed with their Nottingham agents, Messrs. A. G. Neilson & Co., Sherwood Buildings, Nottingham, so that skilled technical service will be continuously available there. 'Phone: "Nottingham 41858."

The Young Accumulator Co. (1929), Ltd., are extending their works in order to cope with increased business. New buildings are being erected on land adjacent to the present factory on the Kingston By-pass at New Malden, which will include offices, stores, showrooms, works extension and a battery service station.

Messrs. Gilbert Ashton & Co., Ltd., Edinburgh, are opening branch premises at 33, Dock Street, Dundee, on August 1st. The branch will be in charge of Mr. T. Naisby.

Messrs. W. Andrew Bryce & Co. have opened a London depôt at 3-4, Ashland Place, Paddington Street, W. (Telephone: Welbeck 1521.)

French Architects at the Lighting Service Bureau

On the occasion of the annual meeting of the Franco-British Union of Architects a distinguished party of French architects visited the E.L.M.A. Lighting Service Bureau at 2, Savoy Hill. In the morning the visitors inspected the various architectural lighting systems and many demonstrations, particular interest being taken in the alterations which are now in progress for the Lecture Theatre and Architectural Studio. They next visited the Curzon Cinema, Mayfair, where Mr. Lorne, of Sir John Burnet, Tait and Lorne, architects to the theatre, met the party and explained the illumination design and pointed out to what a large extent the coloured lighting system contributed to the decorative character of the interior.

Mr. Cox, chairman of the E.L.M.A. Council and also of the Joint Committee of the Architectural Profession and E.L.M.A., who presided at a luncheon at the Cumberland Hotel, welcomed the guests and Monsieur la Prade (inspector-

general of the Ecole des Beaux Arts) replied. Mrs. Schneider replied for the ladies present. Mr. Howard Robertson, speaking on behalf of the architects, expressed the indebtedness of the architectural profession to the Bureau.

Enterprise at Kettering

The Electricity Department at Kettering is making good progress in its campaign to secure new consumers in the outlying towns. A spectacular kettle is used as the trade entry of the Department in various hospital parades, and already two first prizes have been awarded to the tableau illustrated on this page. The children who accompany the entry use small kettles as collecting boxes.

A photograph of a corner of the Department's new showroom at Market Harborough is reproduced on page 119. The showroom was to be opened yesterday (Thursday).

Kettles at Kettering

French Electrical Imports and Exports

The French imports and exports of electrical machinery, apparatus and goods during the three months to the end of March last, as compared with the corresponding period of 1933, are shown in the appended tables. The values are given in thousands of francs, while, for purposes of comparison the sterling value of the total converted at the rate of 80 fr. to the £ is added.

	Imports. January 1st—March 31st, 1933. 1,000 Fr.	1934 10,00 Fr.
Dynamo-electric machinery, transformers and parts ...	12,456	12.252
Telegraph, telephone and other electric apparatus ...	48,729	44,142
Incandescent lamps and radio valves	25,186	14,728
Arc lamps and parts...	65	35
Carbons for electrical and industrial purposes	1,817	1,463
Electric wires and cables	14,206	11,721
Parts of electric apparatus	3,899	4,624
Magnets other than electro-magnets	379	267
Accumulators and parts	894	575
Dry batteries and condensers	6,390	2,850
Porcelain and other insulators	631	634
Total Fr.	114,652,000	93,291,000
Total at 80 Fr. to the £	£1,433,150	£1,166,140

	Exports. January 1st—March 31st. 1933. 1,000 Fr.	1934 1,000 Fr.
Dynamo-electric machines, transformers, and parts ...	12,122	8,491
Telegraph, telephone, and other electric apparatus ...	20,320	19,933
Incandescent lamps and radio valves	5,076	5,129
Arc lamps and parts	60	64
Carbons for electrical and industrial purposes	3,376	3,605
Electric wires and cables	6,162	5,634
Parts of electric apparatus	6,430	4,130
Magnets, other than electro-magnets	64	14
Accumulators and parts	4,327	3,497
Dry batteries and condensers	613	593
Porcelain and other insulators	4,159	2,000
Total Fr.	62,709,000	53,090,000
Total at 80 Fr. to the £	£783,860	£663,625

It is seen that imports show a falling off of £267,010, due chiefly to reduced purchases of telegraphic and telephone material, electric lamps, wires and cables and dry batteries and condensers. A falling off of £120,235 is also shown in the exports of electrical material.

Australian Duty on Rectifiers

An inquiry is being held by the Australian Tariff Board as to the necessity of maintaining the rates of duty provided in the Customs Tariff of 1933 on electric current rectifiers. These duties are 45 per cent. British preference and 65 per cent. general. On behalf of local manufacturers it was asked that the present rates be maintained on rectifiers up to 12 A. One maker stated that he had no competition from the United Kingdom, but that there was competition from the United States. He understood that arrangements were made recently for the British Thomson-Houston Co., of England, to manufacture rectifying valves, so that competition might be expected from Great Britain, particularly if the duties were reduced below the present 33⅓ per cent. (after allowing for exchange adjustments). If no other Australian interests were affected he did not see why free admission in favour of Great Britain should not be given on rectifiers over 12 A.

Prices of Materials

Messrs. F. Smith & Co. report, July 25th: No change in the prices of electrolytic copper bars, wire rods and h.c. wire and silicium bronze wire.

Messrs. James & Shakespeare report, July 25th: No change in the price of copper bars (best selected), sheet and rod, and English pig lead. Electrolytic copper sheets, £32 to £32 5s., 15s. decrease.

Messrs. Edward Till & Co. report, July 25th: No change in the price of india-rubber, Para fine.

Catalogues and Lists

Sterilizair, Ltd., 35, Queen Victoria Street, London, E.C.4.—Particulars of the "Sterilizair" air-conditioning machine.

Elliott Brothers (London), Ltd., Century Works, Lewisham, S.E.13.—A leaflet on a new type of speed and direction indicator.

V. I. Iddon, Ltd., 29, Blackfriars Street, Manchester, 3.—A catalogue of "Nettle" shockproof quick-wiring accessories.

Ferguson, Pailin, Ltd., Higher Openshaw, Manchester.—Leaflets on the type "VSB" ring main unit and type "N" auto-reclose mechanism.

J. H. Holmes & Co., Ltd., Hebburn-on-Tyne.—A booklet on electricity in printing.

British National Electrics, Ltd., Mossend, Lanarkshire.—A new breakfast cooker leaflet.

G. Cohen, Sons & Co., Ltd., 600, Commercial Road, London, E.14.—A copy of the monthly stock list.

British Thomson-Houston Co., Ltd., Rugby.—Particulars of "Mazda Rodo" architectural lamps.

Davidson & Co., Ltd., Sirocco Engineering Works, Belfast.—Particulars of fans for mine ventilation, and a booklet on the dust extracting and ventilating installation at the Higginshaw gas works.

Philips Lamps, Ltd., 145, Charing Cross Road, London.—A catalogue of public address equipment.

Batteries, Ltd., Redditch.—A leaflet on the "Nife" battery.

Hendersons Wholesale Electrical & Radio, Ltd., Electric House, Queen's Road, Brighton.—A catalogue of "Keyway" accessories.

Bruce Peebles & Co., Ltd., Edinburgh.—A catalogue of flameproof a.c. motors.

Bankruptcy Proceedings

Webro Electrical Contractors, 41, Goodge Street, W.C., electrical engineers.—The statutory first meeting of creditors herein was held last week at London Bankruptcy Buildings. The Official Receiver reported that Sidney Samuel West had attended under the proceedings and had stated that he began business as above in May, 1932, with a partner who had gone away. He (debtor) closed the business last April and attributed his failure to heavy overhead expenses, bad debts, and other causes. The liabilities are estimated at £1,000 against assets of trifling value, apart from book debts £300. A resolution was passed for Mr. H. M. Clifford to act as trustee of the estate. The receiving order was made on July 5th upon the petition of Wholesale Fittings Co., Ltd.

A. Leach, 79, Colham Avenue, Yiewsley, Middlesex, formerly trading at 4, Market Street, Otley, Yorks, radio dealer.—The public examination was held recently, at the County Court House, Albion Place, Leeds, when the statement of affairs showed liabilities of £269, with a deficiency of £214. The position was attributed to bad trade and lack of capital. The examination was adjourned for formal closing.

The outside sales staff of Northern Steel and Hardware Co., Ltd., during a visit to the Derby Cable Works, Derby, on July 20th

Left to right: Back Row: Messrs. W. T. Taylor, N.W. Lancashire; C. Tower, N.E. Manchester; D. R. McKenzie, East Lancashire. 2nd Row: Messrs. J. Watson, N.E. Lancashire; E. J. Schofield, Cheshire; E. C. S. Watson, Salford and N.W. Manchester; J. Richards, North Wales; J. Levy, S.W. Manchester. Front Row: Messrs. L. Bell, assistant sales manager; R. H. Ellis, sales manager; W. J. Moggridge, managing director, Derby Cables; Tracey, works manager, Derby Cables; W. C. Farrar, Blackburn depot manager.

G. F. Smith, trading as G. H. Smith & Son, 23, Blossomgate, Ripon, electrical engineer, and at 6, Westgate, Ripon.—The receiving order herein was made on the debtor's own petition recently. The statement of affairs shows ranking liabilities of £1,300 and net assets of £450, leaving a deficiency of £850. The failure is attributed to losses in connection with the busi-

ness at Settle, losses on contracts, and heavy overhead expenses. At the first meeting of creditors held recently Mr. C. H. Baker, York House, Boar Lane, Leeds, was appointed trustee.

A. Fielding, electrician, 223, Whalley New Road, Blackburn.—Receiving order made July 13th on debtor's own petition. First meeting July 27th at the Official Receiver's office, District Bank Chambers, Blackburn. Public examination August 15th at the County Court House, Blackburn.

C. Uren (Eclipse Wireless Co.), 120, Stapleton Road, Bristol.—Receiving order made July 12th on debtor's own petition.

M. Roscoe, wireless dealer, 40, London Road, Northwich.—Receiving order made July 13th, on debtor's own petition. First meeting July 27th at 12, Lonsdale Street, Stoke-on-Trent. Public examination August 30th at the Petty Sessional Court House, Crewe.

H. N. Wicks (H. Wicks & Co.), electrical specialist, Railway Hotel Buildings, Greenhithe, and at Gravesend.—Public examination August 13th at the Court House, Rochester.

The new offices and showrooms of the North-Eastern Electric Supply Co., Ltd., at Chester-le-Street, Co. Durham, which were opened on July 17th by Coun. S. Usher, Chairman of the U.D.C.

A. L. Weekes, electrical engineer, 13, Crescent Road, Luton.—Supplemental dividend of 13s. 8d. in the £, and 4 per cent. statutory interest, payable July 26th at 6, The Parade, Northampton.

M. Glanfield (The Broadway Radio), 7, Broadway, London Road, Portsmouth.—Receiving order made July 18th on debtor's own petition.

A. E. Zeumer (Movitone Radio Co.), 660A, Holloway Road, N.—Discharge suspended for three months until September 22nd, 1934.

T. G. Coaton (T. G. Coaton & Co.), electrical engineer, 16, Humberstone Road, Leicester.—Discharge suspended for six months until December 20th, 1934.

A. E. Bowen, electrical engineer, 103, Market Street, Dalton-in-Furness.—Trustee, Mr. W. G. Pearson, 16, Cornwallis Street, Barrow-in-Furness, Official Receiver, released June 29th.

L. S. Green and **W. H. T. Green** (L. & H. Green), wireless dealers, 162, Great Colmore Street, Birmingham.—Trustee, Mr. C. Hoult, 159, Great Charles Street, Birmingham, Official Receiver, released June 29th.

W. W. Overton, electrical and radio manufacturer, 139, Canterbury Street, Gillingham.—Trustee, Mr. F. H. Langmaid, 280A, High Street, Rochester, Official Receiver, released June 28th.

E. L. Spring, electrical and wireless engineer, 61, Dovecot Street, Stockton-on-Tees.—Trustee, Mr. C. L. Townsend, 80, High Street, Stockton-on-Tees, Official Receiver, released June 28th.

H. W. W. Alford, wireless engineer, 13, Goldsmith Street and 261, High Street, Exeter.—Discharge suspended for three months until September 13th, 1934.

J. Liptrott (Universal Radio & Electrical Co.), 101, High Road, Beeston.—Last day for receiving proofs for dividend July 25th. Trustee, Mr. A. J. Rogers, 22, Regent Street, Park Row, Nottingham, Official Receiver.

L. A. Woodhead, 25a, Charles Street, Bradford, radio dealer.—The application for discharge herein was heard at the County Court, Manor Row, Bradford, on July 10th. It was reported that the receiving order was made in 1926. A dividend of 7s. 2½d. in the £ had been paid on proofs for £406. The discharge was granted, subject to seven days' suspension.

A. L. Roberts, 58, Alfreton Road, Nottingham, radio dealer.—The first meeting of creditors was held at Nottingham on July 10th. The statement of affairs showed a deficiency of £254, and the case was left in the hands of the Official Receiver.

G. E. Morris, wireless dealer, 46a, Newcastle Avenue, Worksop.—Receiving order made July 10th on debtor's own petition. Public examination August 16th at the County Court Hall, Sheffield.

A. E. L. Trebilcock, wireless dealer, Holyrood Street, Chard.—First meeting July 20th at the Parade Assembly Rooms, Taunton. Public examination August 10th at the Municipal Buildings, Taunton.

H. Mortimer (Mortimer Radio & Electric Co.), 4, Green Road, Meanwood, Leeds.—Receiving order made July 7th on debtor's own petition. Public examination August 14th at the County Court House, Leeds.

Company Liquidations

R.R., Ltd., electrical and wireless manufacturers, Eastnor House, Lloyds Place, Blackheath, formerly Newcomen Street, S.E.—The statutory first meetings of the creditors and shareholders under the compulsory liquidation of this company were held on July 17th at Carey Street, W.C., before Mr. J. Barwick Thompson, Official Receiver. A statement of affairs was submitted showing total liabilities of £23,137. The assets, valued at £14,171, are entirely absorbed in the preferential and debenture claims. The company was formed in July, 1929, to carry on business as manufacturers of wireless, electrical, and scientific apparatus and accessories. It took over a business commenced in 1927 by I. W. E. Hustler and F. T. Pankhurst, as mail order suppliers of wireless components under the style of Ready Radio Supply Company. A prospectus was issued in June, 1931, in response to which the public subscribed cash for £13,381 shares. The trading accounts showed a profit of over £17,000 up to March, 1932, but a subsequent loss of nearly £30,000. The failure was attributed by the directors to the action of the group of large radio manufacturers in restraining wholesalers from handling the company's products, and decline in the radio trade from September, 1932, to the end of 1933. The creditors decided to leave the liquidation in the hands of the Official Receiver, but the shareholders nominated Mr. S. Kingsley Tubbs for the post of liquidator and the chairman announced that the appointment would be made by the Registrar in due course.

Reading Electric Supply Co., Ltd.—Winding up voluntarily. Liquidator, Mr. G. W. S. Hawes.

Falcon Batteries, Ltd.—Winding up voluntarily. Liquidator, Mr. L. S. Findlay, 35, Windsor Place, Cardiff. Particulars of claims to the liquidator by September 30th.

Higgs & Griffiths, Ltd.—Particulars of claims by August 17th to the liquidator, Mr. G. W. Spencer, 10, Bush Lane, Cannon Street, E.C.

Eagleston & Son, Ltd.—Winding up voluntarily for reconstruction purposes. Liquidator, Mr. R. W. Thornton, 3 & 4, King Edward Street, Oxford.

W. D. Foster & Co., Ltd.—Meeting, August 17th, at 4, South Place, E.C., to receive an account of the winding-up by the liquidator, Mr. W. A. Oakes.

Dissolution of Partnership

C. H. Smith, electrical contractors, 14, Montreal Road, and 43, Toronto Terrace, Brighton, and at Hove.—Messrs. C. H. Smith and M. F. McCabe have dissolved partnership. Mr. Smith will attend to debts and carry on the business.

New Zealand's Electrical Imports

THE following statement showing the values of the imports of electrical goods into New Zealand last year is based on the official returns of the Dominion. The increase or decrease (chiefly the latter) compared with 1932 is also given in the statement. It will be observed that only under the heading "Other wireless apparatus" is any appreciable increase shown, and that is more than offset by a decline in the imports of complete wireless sets. The competition of Australia in several groups is also a noteworthy feature of the 1933 trade figures.

	1932. £	1933. £	Inc. or dec. £
Batteries and cells—			
Total	133	125	− 8
From U.K.	66	44	−22
,, Canada... ...	19	23	+ 4
,, U.S.A.	10	2	− 8
,, Australia ...	35	54	+19
Insulated cable and wire—			
Total	100	83	−17
From U.K.	96	77	−19
,, Holland ...	1	2	+ 1
,, U.S.A.	1	1	—
Insulators—			
Total	12	10	− 2
From U.K.	7	4	− 3
,, Canada... ...	1	4	+ 3
Filament lamps—			
Total	103	98	− 5
From U.K.	96	90	− 6
,, Holland ...	2	1	− 1
,, U.S.A.	4	5	+ 1
Other electric lamps—			
Total	9	13	+ 4
From U.K.	4	5	+ 1
From Germany ...	1	1	—
,, Japan	1	4	+ 3
Electric ranges—			
Total	8	7	− 1
From Canada... ...	3	5	+ 2
,, U.K.	4	2	− 2
Wireless receiving sets—			
Total	98	66	−32
From U.K.	9	15	+ 6
,, Canada... ...	7	2	− 5
,, U.S.A.	71	45	−26
,, Australia ...	11	4	− 7
Other wireless apparatus—			
Total	151	176	+25
From U.K.	25	38	+13
,, Holland ...	5	4	− 1
,, U.S.A.	79	80	+ 1
,, Australia ...	37	50	+13
Other telegraph and telephone apparatus—			
Total	12	11	− 1
From U.K.	8	8	—
,, U.S.A.	1	1	—
,, Australia ...	1	1	—
Other elec. apparatus (duty free if British)—			
Total	212	170	−42
From U.K.	161	125	−36
,, Canada... ...	1	1	—
,, Germany ...	4	4	—
,, Sweden... ...	7	4	− 3
,, U.S.A.	23	18	− 5
,, Australia ...	9	14	+ 5
Other elec. apparatus (dutiable)—			
Total	42	42	—
From U.K.	27	25	− 2
,, Germany ...	2	1	− 1
,, Canada... ...	3	5	+ 2
,, U.S.A.	3	2	− 1
,, Japan	—	1	+ 1
,, Australia ...	6	7	+ 1
Motors—			
Total	53	42	−11
From U.K.	36	33	− 3
,, Germany ...	6	1	− 5
,, U.S.A.	7	4	− 3

Electricity Supply

Lighting, Domestic, Power

Accrington.—BULK SUPPLY.—The Electricity Committee is in negotiation with the Haslingden Corporation with regard to a bulk supply to Haslingden.

Ashton-under-Lyne.—ALTERNATIVE ASSISTED-WIRING SCHEME.—The Town Council has adopted an alternative assisted-wiring scheme. This is over a period of five years, compared with ten in the original scheme; also there is no provision for iron, lamps, or replacements. A five-point installation can be obtained for £6, or approximately 6d. per week.

Australia.—MELBOURNE.—In his annual report for the year ended December 31st, 1933, the city electrical engineer shows that the sale of electricity increased by 9.76 per cent. to 93,768,897 kWh. The total revenue increased by £17,789 to £580,094, and working expenses rose from £291,115 to £302,849.

Austria.—SUPPLY DISORGANISED.—According to a *Reuter* message from Innsbruck, one of the worst explosions that have yet occurred in Austria happened on July 20th, when high-pressure water conduits, leading from the mountains to the hydraulic power station for the electricity works at Reuette, in Tyrol, were wrecked. Factories and mills in the neighbourhood, depending on electricity, were put out of action. Some of them were forced to take a supply from Germany.

Aylesbury.—REVISED TARIFF.—The Town Council has adopted a revised scale of charges for houses in the borough of 1d. per kWh up to a certain limit, according to base area, and ½d. beyond. The corresponding charges in the rural area are 1¼d. and 0.55d. Hotels, cafés and hospitals using electricity for cooking purposes are included.

EXTENSIONS.—The Town Council has approved of extensions to Owlswick at a cost of £1,370.

Barnes.—REVISED CHARGES.—The Town Council has adopted the following revised scale of charges: Lighting, flat rate, 2½d. per kWh; rateable value, fixed charge of 7½ per cent. of the rateable value, plus 0.33d. per kWh during the summer quarters, and 0.66d. in the winter quarters; heating, 1½d. per kWh; water heating, 3 kWh a penny from October to March, from 10 p.m. to 7 a.m., with unrestricted supplies during the rest of the year; contract, private residences, 2d. per 20-W lamp per week; shop lighting, fixed charge of 3s. per quarter per 100 W installed, plus ½d. per kWh; shop display lighting after closing hours, 1d. per kWh; heating in shops, 1d. per kWh by agreeing to switch off heating from dusk till 9 p.m. from October to March. Cinemas, where matinée performances are given daily, 2d. per kWh; bakers' ovens, 1d. per kWh for the first 500 kWh per quarter per kW of oven, and ½d. per kWh beyond; power, first 1,500 kWh per quarter at 1½d., beyond 0.9d.; cooking, charge under the rateable value tariff at the rate of three kWh per 1d. during the two summer quarters and 1d. per kWh during the winter quarters.

Barnsley.—LOAN.—The Town Council has applied for a loan of £3,610 for distribution mains extensions at Lees Hill, Ardsley, Highstone Lane and a housing site. A scheme of propaganda for the use of electricity is to be carried out in the early autumn, as suggested by the borough electrical engineer.

Bedford.—SUPPLY TO BRICKWORKS.—Reporting further on the scheme for the supply of electricity to the brickworks, the Electricity Committee states that by the substitution of unarmoured for armoured underground cable, and on consideration of actual tenders, it has proved possible to effect a considerable reduction in the estimated cost of the scheme, the revised figure being £20,505.

Birkenhead.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to borrow £7,212 for the purchase of switchgear.

Bournemouth.—REDUCED CHARGES.—The Bournemouth & Poole Electricity Supply Co., Ltd., has decided to reduce the standing charge of 6s. 3d. per quarter per 100 W of installed lighting capacity to 5s. 6d. per quarter in respect of the business two-part tariff.

Braunton (Devon).—OFFER TO PURCHASE UNDERTAKING.—Whitehall Securities Corporation, Ltd., of London, has made an offer to the directors of the Braunton Electric Light & Power Co., Ltd., to purchase the whole of the issue of shares of the company. The directors of the Braunton company have communicated the terms of this offer to their shareholders, by whom a decision will be made in due course.

Brighton.—SUB-STATION.—It is proposed to erect a sub-station in the Preston district, to accommodate a 500-kW mercury-arc rectifier, at a cost of £5,015. This will replace a temporary booster.

ELECTRIC LIFTS.—The Public Assistance Committee proposes to accept an offer of the Express Lift Co., of London, to erect two passenger electric lifts in the Institution for £965. These would replace two hydraulic lifts.

MAINS EXTENSIONS.—The mains are to be extended by 6,238 yards at the cost of £5,163.

LOAN.—The Town Council is to apply for a loan of £100,000 for mains extensions and house services. With reference to the proposed extension of the Southwick generating station, the electrical engineer estimates that the cost of the necessary turbine boiler plant and ancillary apparatus will be £185,000.

Bury St. Edmund's.—ANNUAL REPORT.—In his annual report on the working of the undertaking during the year ended March 31, 1934, Mr. A. E. Knights, the borough electrical engineer, states that the sales of electricity rose by 11.9 per cent., from 2,034,373 kWh to 2,276,449 kWh. Considerable progress has been made in the disposal of domestic equipment and the change-over has been completed.

Chard.—MAINS EXTENSIONS.—The Rural District Council is not objecting to extensions of the overhead mains at Combe St. Nicholas by the South Somerset and District Electricity Company.

Clitheroe.—SUPPLY EXTENSIONS.—The Electricity Committee is considering a supply of electricity to Newton, Slaidburn and Downham.

LOAN.—The Town Council is applying to the Commissioners for sanction to borrow £5,000 for new mains, services, transformers and switchgear.

Coldstream.—SUPPLY ARRANGED.—The Town Council has arranged with the South of Scotland Electricity Supply Co. to provide the borough with a supply of electricity. The cables will be underground in High Street, Market Street, and part of Duns Road.

Croydon.—LOAN SANCTIONED.—The Electricity Committee has received sanction to borrow £20,000 for wiring installations and £20,000 for services. The Committee recommends extending distributors and mains in the borough at a total estimated cost of £4,360.

INCREASED SUPPLY.—The Electricity Committee recommends the provision of an additional supply to the London Passenger Transport Board in connection with the Board's proposal to substitute trolley-buses for tramcars on the Crystal Palace to Sutton route, and the additional demand for energy which is expected to arise on the West Croydon to Tooting section. The estimated cost of the necessary duplicate cables, &c., for the supply is £8,137.

Dorchester.—ALTERNATIVE HOTEL TARIFF.—The charges made to hotels in the borough for electricity supplies have been considered by the Lighting Committee, which recommends that a two-part tariff be introduced, by which the hotels pay a standing charge of £15 per annum per kW demand and 1½d. per kWh; in the event of the hotel proprietors not agreeing to these terms the ordinary terms are to apply.

Douglas (I.O.M.).—THERMAL-STORAGE HEATING.—The Electricity Committee has decided to afford a supply in approved cases for thermal storage and low temperature heating at a flat rate of ¾d. per kWh.

POWER STATION EXTENSION.—Borrowing powers are being sought by the Electricity Department for £40,000 for new plant for the Pulrose generating station. Here it is intended to install a 3,000-3,750-kW turbo-alternator, new plant and switchgear, and a water tube boiler of 40,000-lb. capacity. In addition to this, it is intended to spend during the next nine months £3,800 on mains, meters and electric cookers.

Duns (Berwickshire).—INTRODUCTION OF SUPPLY.—The Town Council has approved plans for the introduction of electricity to the burgh, providing all cables are laid underground.

Exeter.—SUPPLY EXTENSION.—The Electricity Committee is to provide a supply to 302 houses in course of erection on the St. Loye's Estate.

France.—BULK SUPPLY RATES.—A message from our Paris correspondent states that Monsieur P-E. Flandin, Minister of Public Works, has reached an agreement with forty-six light and power companies for a reduction in the electricity rates of light and small power as from July 1st. Reductions are on a sliding scale from 10 to 30 per cent. according to present rates and population. Where the lines are large enough to permit an increase in consumption, commercial rates will also be reduced. There will be no change for the first four months of the year, but a reduction of 20 per cent. will be made for the second four months and a further 40 per cent. for the last four months. On electricity used for cooking and heating there will be a reduction of 20 per cent. on all consumption over 800 kWh per year. It is estimated that no fewer than 2½ million inhabitants of France will benefit by the reductions.

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Burnley	J. E. Starkie	112,990	110,651	63,338	66,591	17,469	13,812	14,331	15,371	7.1
Burton-on-Trent	T. Hall	137,455	153,871	82,910	90,640	16,791	18,948	24,525	29,320	19.4
Cannock	P. Wardle	40,876	46,017	25,787	28,099	900	3,647	5,663	6,214	9.8
Cardiff	C. G. Morley New	287,119	302,153	130,441	142,018	37,649	41,142	49,836	57,117	14.6
Cheadle and Gatley	R. W. Willis	35,564	39,458	—	—	3,338	4,142	Not	stated.	24.7
Clacton-on-Sea	G. Broadhurst	39,810	45,331	17,563	25,050	816	1,106	2,858	3,395	18.6
Coventry	W. J. Marston	395,768	414,252	184,488	212,266	58,150	42,921	103,406	119,365	15.0
Derby	F. Nicholls	261,786	275,768	110,791	114,168	41,154	44,400	—	—	—
Dover	R. C. Harpur	52,176	56,476	24,450	32,129	5,033	6,652	3,811	4,223	10.8
East Ham	W. R. Elliott	141,850	159,322	92,312	103,625	4,425	5,504	13,192	15,800	19.8
Guildford	W. E. Affleck	96,816	102,005	41,260	50,082	17,483	14,936	10,702	12,843	20.0
Hampstead	J. Leadbeater	198,446	198,295	150,099	149,288	19,443	503	28,105	30,130	7.2
Kirkcaldy	O. F. Francis	42,446	41,485	13,766	23,806	759†	532	7,176	8,306	15.8
Leigh	J. B. Hudson	59,271	63,381	39,182	40,817	6,690	8,965	12,370	13,734	11.1
Lincoln	F. Newey	137,010	129,311	88,366	95,610	11,107	3,036†	17,647	19.334	9.6
Leeds	C. N. Hefford	856,548	878,433	340,977	366,142	106,433	77,137	186,445	250,714	34.3
Leicester	J. Mould	527,517	545,476	230,027	236,641	84,459	66,094	85,709	93,375	9.0
Newton-in-Makerfield	W. Phoenix	22,435	24,407	15,662	17,568	2,744	2,125	3,630	4,564	25.7
Portsmouth	B. Handley	357,246	378,947	176,583	188,528	66,371	60,500	50,931	61,120	20.0
St. Marylebone	C. H. Smyth	591,755	608,235	351,273	376,424	42,072	32,980	129,797	140,329	7.9
Scarborough	E. J. Jarvis	106,122	110,659	54,226	54,727	586†	1,913	10,095	9,611	4.3‡
Southend-on-Sea	A. C. Johnson	290,275	253,608	118,737	219,185	78,272	47,103	24,920	31,500	26.5
Stafford	W. H. Robins	54,355	52,801	39,261	37,972	5,569	4,582	9,874	10,525	6.6
Sunderland	A. S. Blackman	174,258	194,952	82,742	105,546	15,444	15,584	32,520	34,480	6.0
Worcester	C. M. Shaw	102,812	111,434	49,760	50,107	10,483	17,215	17,852	19,492	9.2
Walsall	H. A. Howie	147,056	161,230	88,425	97,342	22,022	26,740	16,335	17,194	5.1

* In addition 22,409,675 kWh taken by the Central Board. † Loss ‡ Decrease.

Electricity Supply

Lighting, Domestic, Power

Accrington.—BULK SUPPLY.—The Electricity Committee is in negotiation with the Haslingden Corporation with regard to a bulk supply to Haslingden.

Ashton-under-Lyne.—ALTERNATIVE ASSISTED-WIRING SCHEME.—The Town Council has adopted an alternative assisted-wiring scheme. This is over a period of five years, compared with ten in the original scheme; also there is no provision for iron, lamps, or replacements. A five-point installation can be obtained for £6, or approximately 6d. per week.

Australia.—MELBOURNE.—In his annual report for the year ended December 31st, 1933, the city electrical engineer shows that the sale of electricity increased by 9.76 per cent. to 93,768,897 kWh. The total revenue increased by £17,789 to £580,094, and working expenses rose from £291,115 to £302,849.

Austria.—SUPPLY DISORGANISED.—According to a *Reuter* message from Innsbruck, one of the worst explosions that have yet occurred in Austria happened on July 20th, when high-pressure water conduits, leading from the mountains to the hydraulic power station for the electricity works at Reuette, in Tyrol, were wrecked. Factories and mills in the neighbourhood, depending on electricity, were put out of action. Some of them were forced to take a supply from Germany.

Aylesbury.—REVISED TARIFF.—The Town Council has adopted a revised scale of charges for houses in the borough of 1d. per kWh up to a certain limit, according to base area, and ½d. beyond. The corresponding charges in the rural area are 1½d. and 0.55d. Hotels, cafés and hospitals using electricity for cooking purposes are included.

EXTENSIONS.—The Town Council has approved of extensions to Owlswick at a cost of £1,370.

Barnes.—REVISED CHARGES.—The Town Council has adopted the following revised scale of charges: Lighting, flat rate, 2½d. per kWh; rateable value, fixed charge of 7½ per cent. of the rateable value, plus 0.33d. per kWh during the summer quarters, and 0.66d. in the winter quarters; heating, 1½d. per kWh; water heating, 3 kWh a penny from October to March, from 10 p.m. to 7 a.m., with unrestricted supplies during the rest of the year; contract, private residences, 2d. per 20-W lamp per week; shop lighting, fixed charge of 3s. per quarter per 100 W installed, plus ½d. per kWh; shop display lighting after closing hours, 1d. per kWh; heating in shops, 1d. per kWh by agreeing to switch off heating from dusk till 9 p.m. from October to March. Cinemas, where matinée performances are given daily, 2d. per kWh; bakers' ovens, 1d. per kWh for the first 500 kWh per quarter per kW of oven, and ¾d. per kWh beyond; power, first 1,500 kWh per quarter at 1½d., beyond 0.9d.; cooking, charge under the rateable value tariff at the rate of three kWh per 1d. during the two summer quarters and 1d. per kWh during the winter quarters.

Barnsley.—LOAN.—The Town Council has applied for a loan of £3,610 for distribution mains extensions at Lees Hill, Ardsley, Highstone Lane and a housing site. A scheme of propaganda for the use of electricity is to be carried out in the early autumn, as suggested by the borough electrical engineer.

Bedford.—SUPPLY TO BRICKWORKS.—Reporting further on the scheme for the supply of electricity to the brickworks, the Electricity Committee states that by the substitution of unarmoured for armoured underground cable, and on consideration of actual tenders, it has proved possible to effect a considerable reduction in the estimated cost of the scheme, the revised figure being £20,505.

Birkenhead.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to borrow £7,212 for the purchase of switchgear.

Bournemouth.—REDUCED CHARGES.—The Bournemouth & Poole Electricity Supply Co., Ltd., has decided to reduce the standing charge of 6s. 3d. per quarter per 100 W of installed lighting capacity to 5s. 6d. per quarter in respect of the business two-part tariff.

Braunton (Devon).—OFFER TO PURCHASE UNDERTAKING.—Whitehall Securities Corporation, Ltd., of London, has made an offer to the directors of the Braunton Electric Light & Power Co., Ltd., to purchase the whole of the issue of shares of the company. The directors of the Braunton company have communicated the terms of this offer to their shareholders, by whom a decision will be made in due course.

Brighton.—SUB-STATION.—It is proposed to erect a sub-station in the Preston district, to accommodate a 500-kW mercury-arc rectifier, at a cost of £5,015. This will replace a temporary booster.

ELECTRIC LIFTS.—The Public Assistance Committee proposes to accept an offer of the Express Lift Co., of London, to erect two passenger electric lifts in the Institution for £965. These would replace two hydraulic lifts.

MAINS EXTENSIONS.—The mains are to be extended by 6,238 yards at the cost of £5,163.

LOAN.—The Town Council is to apply for a loan of £100,000 for mains extensions and house services. With reference to the proposed extension of the Southwick generating station, the electrical engineer estimates that the cost of the necessary turbine boiler plant and ancillary apparatus will be £185,000.

Bury St. Edmund's.—ANNUAL REPORT.—In his annual report on the working of the undertaking during the year ended March 31, 1934, Mr. A. E. Knights, the borough electrical engineer, states that the sales of electricity rose by 11.9 per cent., from 2,034,373 kWh to 2,276,449 kWh. Considerable progress has been made in the disposal of domestic equipment and the change-over has been completed.

Chard.—MAINS EXTENSIONS.—The Rural District Council is not objecting to extensions of the overhead mains at Combe St. Nicholas by the South Somerset and District Electricity Company.

Clitheroe.—SUPPLY EXTENSIONS.—The Electricity Committee is considering a supply of electricity to Newton, Slaidburn and Downham.

LOAN.—The Town Council is applying to the Commissioners for sanction to borrow £5,000 for new mains, services, transformers and switchgear.

Coldstream.—SUPPLY ARRANGED.—The Town Council has arranged with the South of Scotland Electricity Supply Co. to provide the borough with a supply of electricity. The cables will be underground in High Street, Market Street, and part of Duns Road.

Croydon.—LOAN SANCTIONED.—The Electricity Committee has received sanction to borrow £20,000 for wiring installations and £20,000 for services. The Committee recommends extending distributors and mains in the borough at a total estimated cost of £4,360.

INCREASED SUPPLY.—The Electricity Committee recommends the provision of an additional supply to the London Passenger Transport Board in connection with the Board's proposal to substitute trolley-buses for tramcars on the Crystal Palace to Sutton route, and the additional demand for energy which is expected to arise on the West Croydon to Tooting section. The estimated cost of the necessary duplicate cables, &c., for the supply is £8,137.

Dorchester.—ALTERNATIVE HOTEL TARIFF.—The charges made to hotels in the borough for electricity supplies have been considered by the Lighting Committee, which recommends that a two-part tariff be introduced, by which the hotels pay a standing charge of £15 per annum per kW demand and 1½d. per kWh; in the event of the hotel proprietors not agreeing to these terms the ordinary terms are to apply.

Douglas (I.O.M.).—THERMAL-STORAGE HEATING.—The Electricity Committee has decided to afford a supply in approved cases for thermal storage and low temperature heating at a flat rate of ¾d. per kWh.

POWER STATION EXTENSION.—Borrowing powers are being sought by the Electricity Department for £40,000 for new plant for the Pulrose generating station. Here it is intended to install a 3,000-3,750-kW turbo-alternator, new plant and switchgear, and a water tube boiler of 40,000-lb. capacity. In addition to this, it is intended to spend during the next nine months £3,800 on mains, meters and electric cookers.

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Bromley	W. G. Trend	67,547	75,517	39,179	44,477	11,667	10,910	6,920	8,878	36.1
Burnley	J. E. Starkie	112,990	110,651	63,338	66,591	17,469	13,812	14,331	15,371	7.1
Burton-on-Trent	T. Hall	137,455	153,871	82,910	90,640	16,791	18,948	24,525	29,320	19.4
Cannock	P. Wardle	40,876	46,017	25,787	28,099	900	3,647	5,663	6,214	9.8
Cardiff	C. G. Morley New	287,119	302,153	130,441	142,018	37,649	41,142	49,836	57,117	14.6
Cheadle and Gatley	R. W. Willis	35,564	39,458	—	—	3,338	4,142	Not	stated.	24.7
Clacton-on-Sea	G. Broadhurst	39,810	45,331	17,563	25,050	816	1,106	2,858	3,395	18.6
Coventry	W. J. Marston	395,768	414,252	184,488	212,266	58,150	42,921	103,406	119,365	15.0
Derby	F. Nicholls	261,786	275,768	110,791	114,168	41,154	44,400	—	—	—
Dover	R. C. Harpur	52,176	56,476	24,450	32,129	5,033	6,652	3,811	4,223	10.8
East Ham	W. R. Elliott	141,850	159,322	92,312	103,625	4,425	5,504	13,192	15,800	19.8
Guildford	W. E. Affleck	96,816	102,005	41,260	50,082	17,483	14,936	10,702	12,843	20.0
Hampstead	J. Leadbeater	198,446	198,295	150,099	149,288	19,443	503	28,105	30,130	7.2
Kirkcaldy	O. F. Francis	42,446	41,485	13,766	23,806	759†	532	7,176	8,306	15.8
Leigh	J. B. Hudson	59,271	63,381	39,182	40,817	6,690	8,965	12,370	13,734	11.1
Lincoln	F. Newey	137,010	129,311	88,366	95,610	11,107	3,036†	17,647	19,334	9.6
Leeds	C. N. Hefford	856,548	878,433	340,977	366,142	106,433	77,137	186,445	250,714	34.3
Leicester	J. Mould	527,517	545,476	230,027	236,641	84,459	66,094	85,709	93,375	9.0
Newton-in-Makerfield	W. Phoenix	22,435	24,407	15,662	17,568	2,744	2,125	3,630	4,564	25.7
Portsmouth	B. Handley	357,246	378,947	176,583	188,528	66,371	60,500	50,931	61,120	20.0
St. Marylebone	C. H. Smyth	591,755	608,235	351,273	376,424	42,072	32,980	129,797	140,329	7.9
Scarborough	E. J. Jarvis	106,122	110,659	54,226	54,727	586†	1,913	10,095	9,611	4.3‡
Southend-on-Sea	A. C. Johnson	290,275	253,608	118,737	219,185	78,272	47,103	24,920	31,500	26.5
Stafford	W. H. Robins	54,355	52,801	39,261	37,972	5,569	4,582	9,874	10,525	6.6
Sunderland	A. S. Blackman	174,258	194,952	82,742	105,546	15,444	15,584	32,520	34,480	6.0
Worcester	C. M. Shaw	102,812	111,434	49,760	50,107	10,483	17,215	17,852	19,492	9.2
Walsall	H. A. Howie	147,056	161,230	88,425	97,342	22,022	26,740	16,335	17,194	5.1

* In addition 22,409,675 kWh taken by the Central Board. † Loss ‡ Decrease.

of overcoming the nuisance caused by the emission of grit and fumes from the power station chimneystacks, Preston Corporation is in process of spending £28,000 on improvements, of which nearly half will go on new stacks, £10,000 on flues, and £2,000 on dust-extractor apparatus.

Rawtenstall.—PROPOSED SUPPLY EXTENSION.—The Electricity Committee is in negotiation with the Burnley Corporation and the Lancs Electric Power Co. with regard to the proposed supply by the Committee to Habergham Eaves. New mains are to be laid in Newchurch Road from Springside to Higher Cloughfold.

Reigate.—LOAN.—The Town Council has applied for a loan of £65,620 for the reorganisation of the electricity supply, as follows: Mains, &c., £48,593; quantities and fees, £3,649; loan costs, &c., £523; plant, £11,840; quantities and fees, £888; loan costs, &c., £127.

Richmond.—REDUCED CHARGES.—The rateable-value tariff is to be reduced for the coming winter quarters from 1d. per kWh to ¾d., and the shop-lighting charge from 4s. 6d. per quarter per 100-W lamp, plus ½d. per kWh to 3s. per quarter.

Southend-on-Sea.—INCREASED MINIMUM CHARGE.—The Town Council has increased the minimum quarterly charge on free hire on installation "A" from 10s. to 25s., and on installation "B" from 3s. to 5s., in order to balance expenditure.

NEW EQUIPMENT.—Five transformer kiosks are to be provided and equipped at a cost of £4,457.

Stockton-on-Tees.—SUB-STATION.—An electricity sub-station is to be built by the Town Council at Hallifield at a cost of £800.

Stone.—REDUCED CHARGES.—Reductions in the charges for electricity were announced at a recent meeting of the Stone Urban District Council, as follows: Ordinary lighting, 7d. to 6d. per kWh; prepayment meters, 8d. to 7d.; shop and hotel lighting, 7d. to 6d.; and from 4½d. to 4d. per kWh, with an alternative tariff of £3 per kW per quarter of maximum demand and 1½d. per kWh; heating and cooking for business premises, first 240 kWh at 2d., all beyond at 1d.; power, ½d. per kWh reduction throughout the present scale; multi-part tariff, first 240 kWh reduced from 1½d. to 1d., all in excess at ¾d.; electrical showrooms, 1½d. to 1d. per kWh.

Stow-on-the-Wold.—OVERHEAD LINES.—The Rural District Council has approved a plan submitted by the Wessex Electricity Co. for the extension of the overhead lines from Kingham to Bourton-on-the-Water.

Stretford.—REDUCED CHARGES.—The Electricity Board has decided to reduce the charges in Urmston, Flixton, Davyhume, Irlam and Cadishead by ½d. per kWh.

Wallasey.—PURCHASE OF CABLES.—The Electricity Committee recommends the purchase from the Birkenhead Corporation of two 6,600-volt cables laid in Dock Road between the generating station and Gorsey Lane at the price of £2,000.

West Lancashire.—TRANSFER OF UNDERTAKING.—The West Lancashire Council has decided to transfer its electricity undertaking in the parishes of Rufford, Tarleton, Hesketh Bank, Banks, Scarisbrick and Halsall to the Lancashire Electric Power Company, conditional upon the company taking over all liabilities and assets, and the price of electricity to consumers being reduced to the scale charged by the company in the adjoining districts.

Winchcombe.—The Rural District Council has raised no objection to the extension of the overhead lines to Stanway, *via* Greet and Hailes, by the Shropshire, Worcestershire & Staffs Electric Power Co., Ltd.

Yarmouth.—NEW SWITCHGEAR.—The Electricity Committee has instructed the town clerk to obtain tenders for the supply of additional switchgear.

Traction

Brighton.—TRACK RENEWAL.—Part of the tramway track is to be relaid in the autumn.

France.—RAILWAY ELECTRIFICATION.—According to M. Raoul Dantry, general manager, the French State railways have decided to electrify the 130-mile main line from Paris to Le Mans, near Versailles. This conversion will be carried out on the 1,500-V d.c. system, and power will be obtained from the hydro-electric stations in Central France and from steam power stations near Paris.

Italy.—UNDERGROUND TRAMS FOR MILAN.—*The Times* Milan correspondent reports that the Podestà of the city has announced that an attempt will be made to alleviate the traffic congestion in the centre of the city by instituting an underground tramway service.

A scheme for tube railways has been under consideration for many years, but it is not likely for many reasons to take practical shape for a long time yet. The Podestà has nevertheless decided to construct three of the principal tunnels envisaged in this scheme and for the time being to run the tramcars through these. The present tramcars can, it is said, be used without modification, while the stations will serve for the underground trains when these are introduced. In some parts of the tunnels four lines will be laid, in other parts two. The work will, it is hoped, be started next year, and should be completed in less than three years.

London.—UNDERGROUND RAILWAY.—The London Passenger Transport Board has decided to close the Brompton Road station when the new West Kensington station is opened.

L.N.E. Railway.—TYNESIDE ELECTRIFIED AREA.—The London and North Eastern Railway Company is embarking upon an extensive scheme of modernisation in the Tyneside electrified area, where electric working was introduced early in 1904.

Two additional sub-stations and improved conductor rails over certain portions of this area have already been installed, and it has now been decided to replace a large proportion of the electric rolling stock, whilst that remaining will be entirely reconditioned. Ninety-one new vehicles, including motor coaches, trailer coaches, and motor vans, are to be built. The coaches will be of the open type, constructed of steel, and electrically lighted and heated and decorated on modern lines.

A new station has been constructed at West Monkseaton, and many minor alterations are to be carried out to improve the amenities of the existing stations. The signalling arrangements in the vicinity of Newcastle are also to be improved so as to increase the working capacity of the lines.

DIESEL-ELECTRIC RAILCAR.—Britain's pioneer streamlined railbus, which has been in trial service in the Newcastle-on-Tyne area since last September, has been purchased by the L.N.E.R., according to an official announcement. The railbus, which was built at Newcastle by Sir W. G. Armstrong Whitworth, was the first streamlined diesel unit to be put into regular service on a British railway, and was designed to provide the railway companies with a weapon against road competition.

During the last ten months the railbus has conducted a local stopping service over difficult gradients in the Western Newcastle-on-Tyne area. Throughout this period it has worked fourteen hours per day and covered more than 700 miles per week. Fuel costs throughout the trial period have averaged ½d. per mile. It is understood that during the summer the railbus will be employed in the Scarborough area, where it will duplicate when necessary the circular tour now being worked by the "Tyneside Venturer" diesel-electric railcar.

Sunderland.—NEW TRAMS.—The Transport Committee have decided to purchase three new tramcars at an estimated cost of £5,700.

Switzerland.—HIGH-SPEED ELECTRIC CARS.—The general standard of the track on the Swiss Federal Railways has proved unsuitable for the present electric locomotives to run at a greater speed than approximately 58-60 m.p.h., and to provide faster and more frequent services a number of light semi-streamlined double-bogie motor coaches are being built. The electrical equipment is being constructed by Brown Boveri, Oerlikon, and Secheron, and includes two 175-h.p. nose-suspended motors on one bogie, the power for which is taken from the line at 15 kV and passed through a 220-kVA oil-cooled transformer. These cars will seat eighty-eight persons on a tare weight of 32 tons, and will have a maximum speed of 78 m.p.h.

Traffic Signals.—The Hertfordshire Highways Committee recommends the installation of traffic control signals at Chorleywood Road, Station Road, and the By-pass Road, Rickmansworth, at an estimated cost of £700.

Wandsworth Borough Council proposes to install automatic traffic signals in Streatham at the junctions of Mitcham Lane and Ambleside Avenue, and Leigham Court Road and Valley Road.

Communications

Germany.—WIRELESS LICENCES.—During June there was a further decrease in the number of licences taken out. The total at July 1st was 5,359,480, which is 41,940 less than on June 1st.

Great Britain.—RADIO RELAY SERVICES.—Owing to opposition by several Members of Parliament, the Tynemouth Town Council has decided to withdraw from its General Purposes Bill now before Parliament a clause which seeks power to use their electricity supply lines for broadcast programmes. The Bill is mainly concerned with water supply and the Council feared that unless the clause was withdrawn it would hamper the passage of the Bill through Parliament. Previously it was the intention of the Council to rent the electricity lines to transmitting companies for broadcasting.

Burnham-on-Sea Urban District Council, after receiving a deputation representing local traders, has accepted the offer of Christy Bros. & Co., Ltd., to operate a relay service in the town.

WIRELESS LICENCES.—During June 234,150 wireless licences were issued, representing a net increase of 34,000 during the month. The total number in force at the end of the month was 6,373,600 as compared with 5,597,200 a year ago.

Turkey.—GOVERNMENT TO ACQUIRE TELEPHONE CO.—Negotiations will shortly be opened between the Turkish Minister of Public Works and representatives of the Istanboul Telephone Co., which until recently was a British concern, for the purchase of the company by the Turkish Government. This follows an announcement by Ali Bey, the Minister concerned, that the Turkish Government had decided to acquire the company. The telephone company, the director and principal officials of which are all British, has in the course of the last year been at a considerable expense in installing an automatic service. It is understood that the International Telephone Co. of America has acquired a controlling interest in the concern. No mention has so far been made as to the price the Turkish Government is prepared to pay for the company.—*Reuter* (Istanboul).

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Aldershot.—August 10th. Electricity Department. Interior work on consumers' premises in connection with the change-over from d.c. to a.c. (July 20th.)

Argentina.—BUENOS AIRES.—August 13th. State Oilfields. Electrical equipment, consisting of transformers, circuit-breakers and accessories. (A.Y. 12490.)*

Australia.—MELBOURNE.—August 28th. Posts and Telegraphs Department. Various types of telephone relays. (A.Y. 12462.)*
September 4th. Telephone tags, connection plates, strips and terminals. (A.Y. 12497.)* Vitreous resistances. (A.Y. 12473.)* Telephone switchboard plugs and sleeves. (A.Y. 12472.)*
September 11th. Telephone instrument cords. (A.Y. 12506.)* Condensers of various capacities. (A.Y. 12500.)*
September 18th. Telephone receivers together with spare earpieces, &c. (A.Y. 12501.)*
August 14th. Loading coil pots. (A.Y. 12426.)*
August 20th. State Electricity Commission of Victoria. 10,000-kVA transformer complete with spare coils and bushings. (A.Y. 12460.)*

Beckenham.—August 27th. U.D.C. L.p. cable requirements until December 31st, 1934. (See this issue.)

Bedford.—August 20th. Electricity Department. Supply during twelve months of meters, water heaters, cookers, kettles, and other appliances. (July 20th.)

Belfast.—August 4th. Electricity Department. One 30,000-kW turbo-alternator and step-up transformers. (June 29th.)

Cardiff.—August 25th. Electricity Department. 33-kV cable and metal switchgear, four 15,000-kVA transformers, and lamps. (See this issue.)

Devon.—July 28th. Standing Joint Committee. Supply during 1935, 1936 and 1937 of police accoutrements, comprising electric lamps, &c. Form of tender from Chief Constable of Devon, Exeter; tenders to Clerk to the Committee, The Castle, Exeter.

Durham.—County Education Committee. Electric lighting of the Town Law senior mixed council school. Particulars from F. Willey, County Architect, 34, Old Elvet.

Egypt.—CAIRO.—August 15th. Ministry of the Interior. Single-phase, single-tariff meters. (A.Y. 12440.)*
August 14th. Materials in connection with the installation of a distribution sub-station at Calioub. (A.Y. 12476.)*
August 4th. Electrical material in connection with a distribution sub-station at Barrages and transmission lines between Kaha and Barrages. (A.Y. 12468.)*

Halifax.—August 8th. Electricity Department. Electric wash-boilers. (See this issue.)

Hastings.—August 15th. Electricity Department. Electricity meter-testing equipment. (See this issue.)

Kentisbeare.—August 4th. Wiring and fittings for electric lighting at the Church. Particulars from, and tenders to, A. Paul Dashwood, secretary of the Parochial Church Council.

Kesteven.—County Council. Electrical work at Sleaford County Institution. (See this issue.)

Kingston-upon-Thames.—August 4th. Corporation. Vehicle-actuated automatic traffic control signals at junction of Fairfield West-Knight's Park. Specifications from Borough Surveyor, 3 and 5, Thames Street (deposit £1 1s.).

Lancashire.—August 11th. County Council. Pumps, electric motors and pumping mains at the Mussel purification station, Lytham. Applications to tender to County Architect by July 30th; specifications, bills of quantities, &c., from Office of the County Architect, County Offices, Preston (deposit £2); tenders to Clerk of the County Council, County Offices, Preston.

Lewes.—July 28th. Corporation. Electrically driven centrifugal pumping plant at South Street pumping station. Specifications from Borough Surveyor, Town Hall (deposit £2 2s.).

Newport (Mon).—August 13th. Electricity Department. Two water-tube boilers, with super-heaters, &c. (July 13th.)

New Zealand.—WELLINGTON.—Post and Telegraphs Department. August 15th. 1,000 50-V telephone switchboard lamps. (A.Y. 12452.)* 50,000 dry cells for telephone use. (A.Y. 12455.)*
August 20th. 750 microtelephone handles. (A.Y. 12453.)*
Public Works Department. August 21st. Sixteen 300-W outdoor station lighting fittings. (G.Y. 13999.)*

Siam.—BANGKOK.—August 31st. Royal State Railways. Cable and wire. (A.Y. 12489.)*

South Africa.—CAPE TOWN.—August 8th. Street-lighting fittings. (G.Y. 14017.)*
Electricity Department. August 29th. 6,000 porcelain weatherproof pole fuses for consumers' service connections. (A.Y. 12499.)*
August 22nd. Power, pilot and telephone cables with joint boxes and jointing material. (A.Y. 12509.)*
JOHANNESBURG.—Railways and Harbours. August 13th. Electric lamps required during the year 1935. (A.Y. 12475.)*
Municipality. August 18th. Black double-braided weather-proof hard-drawn copper conductors for overhead transmission lines. (A.Y. 12496.)*
PRETORIA.—Government Supplies Board. August 17th. Telephone terminal blocks, indoor-type protectors fitted with carbons and fuses, and plunger or lever hold-down type switches. (A.Y. 12471.)*

Southampton.—August 21st. Electricity Department. One 25,000-kW turbo-alternator and two 160,000-lb. boilers. (July 13th.)

Southend-on-Sea.—September 3rd. Electricity Department. Supply for a period of two years of h.p. and l.p. underground cables. (See this issue.)

Swansea.—July 31st. Electricity Department. E.h.p. cubicle, switchboards and metal-clad switchgear, and l.p. sub-station feeder fuse panels. (July 20th.)
August 3rd. Electricity Department. Auxiliary switchgear for Tir John power station. (July 6th.)
August 17th. Electricity Department. Two batteries, one motor generator and two oxide film metal rectifiers for Tir John power station. (See this issue.)

Uruguay.—MONTEVIDEO.—August 10th. State Electricity Supply and Telephones Administration. Cable and indoor terminal boxes, insulating compound and spares. (A.Y. 12510.)*

Worthing.—August 20th. Corporation. Seven sets of electrically driven, vertical, unchokeable, centrifugal sewage pumps and one centrifugal borehole pump. Specifications from J. Taylor & Sons, Caxton House, Westminster, S.W.1 (deposit £5); tenders to Town Clerk's Office, Town Hall.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Ayr.—County Council. Accepted. Electrical work for 146 houses at Stevenston.—Colquhoun & McArthur.

Bedford.—Electricity Committee. Recommended. Switchgear (£2,144).—British Thomson-Houston Co., Ltd. Two 5,000-kVA transformers (£2,704).—British Electric Transformer Co., Ltd.

Blyth.—Education Committee. Recommended. Electric lighting at Louise Road school (£209).—Blyth Plumbing & Electric Co.

Brighton.—Accepted. Retubing condenser at Southwick power station (£1,105).—Yorkshire Copper Works, Ltd.

Burntwood.—Mental Hospital Visiting Committee. Accepted. Installation of electrical services in new buildings (£2,019).—T. Glover.

Chatham.—Town Council. Accepted. Electric traffic-control signals at Luton Arches (£462).—Siemens & General Electric Railway Signal Co., Ltd.

Croydon.—Health Committee. Recommended. Wireless installations at Cheam sanatorium (£129).—Edison Swan Electric Co., Ltd.

Gateshead.—Town Council. Accepted. Electrical installations at eighty houses on the Saltmeadows estate (£317).—J. Newton.

Government Contracts.—The following contracts were placed by the various Government Departments during June :—

ADMIRALTY (CONTRACT AND PURCHASE DEPARTMENT).

Alternators, motor, control gear, &c.—Small Electric Motors.
Electric bakery plant.—Baker, Perkins, Ltd.
Battery components.—Chloride Elecl. Storage Co.
Electric cable.—Anchor Cable Co.; B.I. Cables; Craigpark Electric Cable Co.; Connollys; Edison Swan Cables; Enfield Cable Works; G.E.C.; Greengate & Irwell Rubber Co.; W. T. Glover & Co.; Hackbridge Cable Co.; Henley's; Hooper's Telegraph & I.R. Works; Johnson & Phillips; Liverpool Electric Cable Co.; Macintosh Cable Co.; Mersey Cable Works; Pirelli-General Standard Telephones; St. Helens Cable & Rubber Co.; Siemens Electric Lamps & Supplies; Ward & Goldstone.
Electrical gear for seaplane cranes.—W. H. Allen, Sons & Co.
Motors and control gear for lathes.—B.T.-H., Met.-Vick. Elecl. Co.
Motors for lathes.—Laurence, Scott & Electromotors.
Control gear for lathes.—Brookhirst Switchgear.
Switchgear for rolling mills.—G. Ellison.
Motors for plate scarphing machine.—Lancashire, Dynamo & Crypto.
Control gear for plate scarphing machine.—Allen West & Co.
Switchboards.—Bertram Thomas; Whipp & Bourne.
Electrical gear for cordage testing machine.—G.E.C.
Copper, brass and phosphor-bronze wire.—Thomas Bolton & Sons; C. Clifford & Son; Richard Johnson & Nephew.

WAR OFFICE.

Aluminium silicon sheet, &c.—B.I. Cables.
Electric cable.—Standard Telephones; Telegraph Construction & Maintenance Co.
Electric fans.—Veritys.
Generators.—Electro Dynamic Construction Co.
Transformers.—B.T.-H.

AIR MINISTRY.

Fuse boxes.—Phœnix Telephone & Electric Works.
Direction finder.—Marconi's.
Petrol electric generating sets.—Stuart Turner.
Inertia starters.—Rotax, Ltd.
Voltage regulators.—D. H. Bonnella & Son.

POST OFFICE.

Telephonic apparatus.—Ericsson Telephones; Standard Telephones; Telephone Mfg. Co.
Testing and protective apparatus.—Ernest Turner Electrical Instruments.
Dry batteries.—Siemens Bros.
Electric bells.—Gent & Co.
Brackets, &c.—Bullers.
Cable.—B.I. Cables; Connollys; Enfield Cable Works; Hackbridge Cable Co.; Henley's; Siemens Bros.; Standard Telephones; United Telephone Cables.
Loading coils.—Automatic Electric Co.; Standard Telephones.
Telephone cords.—London Electric Wire Co. & Smiths; L.P.S. Electrical Co.; Standard Telephones.
Rectifiers and parts.—Ediswan; Westinghouse Brake & Saxby Signal Co.
Armoured cable laying, &c.—Liverpool-Glasgow.—Standard Telephones.
Telephone exchange apparatus.—Derwent.—Ericsson Telephones. Sub-contractors: Chloride Elecl. Storage Co. for batteries; Electric Construction Co. for generator and ringing

machines. Sheffield.—Siemens Bros. Sub-contractors: Chloride Elecl. Storage Co. for batteries; Electric Construction Co. for generator and ringing machines. Feltham (London).—Siemens Bros. Ealing, Welbeck.—Standard Telephones. Taunton.—Ericsson Telephones. Sub-contractors: Chloridge Elecl. Storage Co. for batteries; Crompton Parkinson for generators; Electric Construction Co. for ringing machines. Elstree.—Standard Telephones. Sub-contractors: Tudor Accumulator Co. for batteries; Electric Construction Co. for generator. Liberty (London).—Ericsson Telephones. Eastleigh.—Siemens Bros. Ryde.—Standard Telephones. Sub-contractors: D.P. Battery Co. for batteries; Electric Construction Co. for generators. London Wall.—Automatic Electric Co. Sub-contractors: Electric Construction Co. for ringing machines. Manchester Central.—G.E.C.

Voice frequency apparatus.—Oxford, Exeter.—Standard Telephones.

Repeater station equipment.—Whitchurch (Salop), Derby, Fenny Stratford.—Standard Telephones.

H.M. OFFICE OF WORKS.

Electric passenger lifts at Ministry of Health new public offices and Science Museum office block.—Evans Lifts, Ltd.

Rewiring for electric lighting the Royal Courts of Justice.—Electrical Installations, Ltd.

CROWN AGENTS FOR THE COLONIES.

Electric motors.—Electric Construction Co.
Electricity meters.—Ferranti, Ltd.
Switchgear.—Electric Control, Ltd.
Telephone exchange apparatus.—G.E.C.
Teleprinters, &c.—Creed & Co.
Transformers.—Johnson & Phillips.
Wire.—Whitecross Co.; Richard Johnson & Nephew.
Wireless transmitter.—Marconi's.

Inverness.—In submitting a report on the heating and electrical plant to a meeting of the Inverness District Asylum Joint Committee last week, Sir Robert Brooke said that the plant was estimated to cost £18,000, which was much in excess of expectations. The consulting engineer was asked to see what expenditure could be cut out. Sir Robert said that the price of the boilers had risen very considerably since the scheme was first before the committee, and they could not go back to the combined authorities for power to incur more expenditure. Another speaker commented upon the fact that all the boiler tenders were the same. The boiler committee was asked to consider the matter further.

Lanark.—County Council. Accepted. Electric lighting installation at St. Margaret's Roman Catholic School (£301).—Small & Macdonald.

London.—SHOREDITCH.—Libraries Committee. Recommended. Electric book lift at Hoxton Libary (£172).—London Lift Co.

Purposes Committee. Recommended. Microphone system at Town Hall (£187).—British Thomson-Houston Co., Ltd.

Electricity Committee. Recommended. Switchboard (£328).—J. G. Statter & Co., Ltd.

FINSBURY.—Borough Council. Recommended. Traffic signals (£693).—Automatic Electric Co., Ltd.

L.C.C.—Hospitals and Medical Services Committee. Accepted. Electric bed lifts at Bethnal Green, St. Charles', Fulham, Grove Park and Hammersmith Hospitals (£6,586).—Pickerings, Ltd. Rewiring of wards at Eastern Hospital (£560).—Gillham & Jones. Improvements of ward lighting at Grove Park Hospital (£248).—Harland & Woolf, Ltd. Wiring and fittings for electric lighting at Hackney Hospital and institution (£1,963) and electrical installations at St. Luke's Hospital (£649).—Samuel Reed & Sons. Electrical installations at Hammersmith Hospital (£4,530).—T. Clarke & Co., Ltd. Wiring and fittings for electric fire alarm system at Park Hospital (£358) and electrical installations at St. Peter's Hospital (£530).—G. E. Taylor & Co. Electric lighting and power at St. Alfege's Hospital and Institution (£409).—W. J. Furze & Co. (London), Ltd. Electrical installation at St. Charles' Hospital (£1,034).—Electrical Installations, Ltd. Electrical installations at St. Mary's Hospital (£549).—J. Briggs, Electrical Contractors, Ltd.

PADDINGTON.—Works Committee. Recommended. Installation of traffic signals at six road junctions (£2,923).—Automatic Electric Co., Ltd.

ST. PANCRAS.—Contracts and Stores Committee. Recommended. Vehicle-actuated traffic signal at Euston Road (£2,627).—Siemens & General Electric Railway Signal Co., Ltd. Additional equipment at Wells Street sub-station (£105).—A. Reyrolle & Co., Ltd. Six economiser sections for Niclausse boilers (£246).—Brown & Tawse, Ltd. Cables.—Standard Telephones & Cables, Ltd.; Telegraph Construction & Maintenance Co., Ltd.; Metropolitan Electric Cable & Construction Co., Ltd.; Hackbridge Cable Co., Ltd. Gas-discharge lamps and fittings, complete with all necessary control gear, &c.—British Thomson-Houston Co., Ltd.

STEPNEY.—Electricity Supply Committee. Recommended. Meters.—Reason Manufacturing Co., Ltd.; Telsen Electric Co., Ltd.; Metropolitan-Vickers Electrical Co., Ltd.; Ferranti, Ltd.; Chamberlain & Hookham, Ltd.

WANDSWORTH.—Borough Council. Automatic traffic signals.—Siemens & General Electric Railway Signal Co., Ltd.

Manchester.—Transport Committee. Accepted. Cadmium copper trolley wire.—R. Johnson & Nephew, Ltd.

Electricity Committee. Accepted. Two neutral earthing switch cubicles.—Harland Engineering Co., Ltd. Sub-station kiosk and switchgear.—Ferguson Pailing, Ltd.

Education Committee. Accepted. Electric goods lift at Jackson's Row stores.—W. Wadsworth & Sons, Ltd. Electrical installation at Darlington Street centre.—A Loudon.

Portland.—Water Committee. Diesel engine, alternator, &c.—W. H. Allen & Sons, Ltd. Transformer, switchboard, &c.—Johnson & Phillips, Ltd.

Reigate.—Corporation. Accepted. Cables and laying, &c. (£31,692), disconnecting pillars (£792).—Callender's Cable & Construction Co., Ltd. Majn switchboard (£1,595).—Switchgear & Cowans, Ltd. Kiosks, switchgear and transformers (£10,245).—Park Royal Engineering Co., Ltd.

Wallasey.—Electricity Committee. Accepted. Tower wagon with "Nife" battery (£586).—General Vehicle Co., Ltd.

Notes

Power Station Extensions

Particulars of new generating plant to be installed in existing selected stations, for which directions had been issued by the Central Electricity Board, were given in our issue of July 13th (p. 66). Other stations to be extended are: Norwich, 110,000-lb.-per-hr. boiler; Ironbridge (W. Midlands J.E.A.), 50,000-kW turbo-alternator and two 250,000-lb. boilers; Brighton, 30,000-kW turbo-alternator and 150,000-lb. boiler; Hams Hall (Birmingham), two 50,000-kW turbo-alternators, five 250,000-lb. boilers, and cooling tower. The preliminary proposals for the extension of North Wilford (Nottingham) have now been confirmed at one 30,000-kW set and four 175,000-lb.-per-hr. boilers.

A Very Unusual Refrigerator

A correspondent has seen in one of the Sunday newspapers a mention of a "refrigerator three times the size of a wrist watch which holds a piece of dry ice, the temperature of which when enclosed is 109 deg. below zero." He asks us if we know the manufacturers of, or agents for, this extraordinary piece of apparatus. We must confess our ignorance, but perhaps some of our readers could help.

An E.A.W. Speakers' Course

The Electrical Association for Women has arranged a three-day speakers' lecture course, to commence on September 26th, at King's College of Household and Social Science, London, including a demonstration at the E.L.M.A. Lighting Service Bureau and a social evening at the Brompton & Kensington Electric Supply Co.'s showrooms. Residential accommodation will be available at the College, and forms of application should be returned to the E.A.W. headquarters not later than September 1st.

I.E.E. Students' Sports Meeting

A sports meeting between the London Students' Section of the I.E.E. and the London Students of Civil Engineering to decide the holders of the Young trophy for the season 1934-1935 was held recently at Boston Manor Playing Fields, the events consisting of cricket and tennis matches. In the cricket match the I.E.E. students finished with a total of 118 runs and the Civil Engineering students were then dismissed for 80. The I.E.E. students did not fare so well in the tennis match, losing by 64 games to 90, but when points for cricket and tennis were totalled the I.E.E. students won by 13 points to 12, therefore becoming holders of the trophy for the second year in succession. In the eliminating round held previously the Civil Engineering students had qualified to meet the I.E.E. students by winning both their matches against the Students Section of the Institution of Mechanical Engineers. Among the visitors were Mr. P. V. Hunter, president of the Institution of Electrical Engineers, who presented the trophy; Mr. H. T. Young, who gave the trophy and to whose generosity the function was due; Messrs. Rowell and Rayner, of the I.E.E.; and Mr. R. St. L. Pendred, past president of the Institution of Mechanical Engineers. Our picture shows Mr. Hunter presenting the trophy to Dr. Thompson, captain of the I.E.E. Students.

Mr. P. V. Hunter presenting the Young trophy to Dr. Thompson, captain of the I.E.E. Students

Appointments Vacant

Shift engineer for Electricity Department, Aden Settlement.

Assistant in the Electrical Engineering Department of Coventry Technical College.

Executive engineer in Punjab Public Works Department, Electricity Branch.

Electrical engineer and manager for Sunderland Corporation Electricity Department (salary £1,250 rising to £1,500).

Chief electrical inspector (£293 per annum) for the Southend-on-Sea Corporation Electricity Department.

(See our classified advertisements.)

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. N. A. S. Campbell, Dingwall, has been appointed engineer and manager of the Ross-shire Electric Supply Company, in succession to the late Mr. T. Dalling.

Mr. F. Stoyle has been appointed full-time secretary of the Institution of Welding Engineers, Ltd., and is now at the new offices at 7-8, Holborn Hall, Gray's Inn Road, W.C.1. The telephone number is Holborn 4683.

Mr. T. Gerrard

Mr. A. G. Port was presented with a fitted dispatch case on Saturday last by the employés of the West Hartlepool Corporation Electricity undertaking upon his leaving Hartlepool to take up the new post as district engineer in the Malton district of the North Eastern Electric Supply Co., Ltd. Mr. Port has been district engineer at Hartlepool for the North Eastern Electric Supply Co. for the past twelve years.

Mr. T. Gerrard, electrical engineer and manager of the Mirfield (Yorks) Urban District Council's electricity undertaking, has been appointed manager of the Wick Corporation Electricity Department in place of Mr. W. C. Roy, who recently resigned. There was 110 applications for the post.

Mr. D. W. Fry, of the research laboratory staff of the General Electric Co., Ltd., Wembley, who was recently married to Miss J. F. Wright, has been presented by his colleagues with a cheque.

Mr. J. Knudtzon, of Copenhagen and Bangkok, Siam, managing director of the Siam Electrical Co., was married at Compton Church, Hants, last week, to Miss C. P. Judd.

Mr. A. J. Kips, who retired from the service of Messrs. W. T. Henley's Telegraph Works Co., Ltd., on reaching the age limit of sixty-five, on July 17th, joined the company as outdoor assistant to the late Mr. W. J. Potter in 1904. Previously he had been with the Silvertown Co. at Cannon Street since 1892. Mr. Kips was one of the best known of Henley's outdoor men, and during his early days with the company he visited all the generating stations in the London area, from Uxbridge to Woolwich and from Watford to Croydon. Members of the staff who had known Mr. Kips for a number of years met him at supper at the White Hart Hotel, Giltspur Street, on July 6th, when Mr. Anderson, sales manager, presided; and on July 17th Mr. W. F. Bishop, director and general manager, presided over a large company of Mr. Kips's friends

The presentation to Mr. A. J. Kips on his retirement from Messrs. W. T. Henley's Telegraph Works Co., Ltd.

at head office and presented him, on behalf of the staff, with a Westminster chimes clock and a cheque.

Mr. J. Linton, A.M.I.E.E., mains engineer with the Southend-on-Sea Electricity Department, has been appointed by the Town Council as chief assistant engineer.

Mr. E. G. W. Goble, chief inspector of the Southend Electricity Department, has been appointed electrical and general engineer of the Pier and Foreshore Department.

In our last issue (page 83) we reproduced photographs of some of the I.E.E. overseas members present at the Conversazione held at Savoy Place. We regret that **Miss Morton,** who appears in one of the groups, was incorrectly referred to as Mrs. A. W. Chown Hirst.

The authors of the article on "Horizontal Lanterns for Electric Discharge Lamps" on page 111: Left, Mr. R. Maxted, B.E.; right, Mr. L. J. Davies, M.A., B.Sc.

Mr. Samuel Insull.—The *Electrical World* reports that, with a formal plea of "not guilty," Samuel Insull answered the indictment of a Federal grand jury charging him and sixteen others with using the mails to defraud. Insull's counsel argued for a bill of particulars, and Federal Judge J. H. Wilkerson took the motions under advisement, pending a ruling on July 9th. Mr. Insull will be tried before the Cook County Criminal Court on charges of larceny and embezzlement preferred by the State of Illinois on October 22nd.

[*Lafayette*

Mr. D. S. Barry

Mr. D. S. Barry, who has been chief assistant in the Sales and Estimating Department of Switchgear & Cowans, Ltd., Old Trafford, Manchester, since 1925, has succeeded the late Mr. S. H. Finney as chief of that department.

Mr. J. E. Blackshaw, formerly of British Thomson-Houston Co., Ltd., and Messrs. A. C. Cossor, has been appointed works manager of the Whiteley Electrical Radio Co., Ltd.

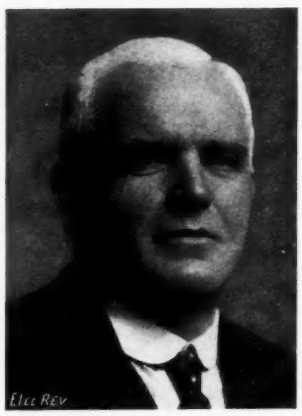
Sir Thomas Royden, Bt., C.H., of Brockwood Park, Alresford, Hants, has been appointed joint trustee for the debenture stockholders of British Insulated Cables, Ltd., taking the place of the late Sir Max Muspratt, Bt. The remaining trustee is the Hon. Sir Arthur Stanley, G.B.E., C.B., M.V.O.

Obituary

Mr. E. B. Dinenage.—The death occurred on July 9th of Mr. Edgar B. Dinenage at his home at Wylde Green, Birmingham. He was a director of Messrs. Dowding & Mills, Ltd., electrical repair specialists, Bordesley, Birmingham. Prior to joining the board of Messrs. Dowding & Mills he was manager of Robinson & Hands Electrical Co., Ltd., and for a number of years he was at the Witton Works of the General Electric Co., Ltd. He leaves a widow, a son and a daughter.

Mr. E. T. Ball.—The death occurred on July 17th, following an operation, of Mr. Edwin Thomas Ball, who had for over thirty years been in the Electrical Department of Messrs. Stothert & Pitt, Ltd., Bath.

Mr. A. W. Blake.—We regret to record that Mr. A. W. Blake, the chief electrical engineer to Willesden Borough Council, died on July 20th. He was born at Wickham Market, Suffolk, in 1873, and served his apprenticeship with Whitmore & Binyon, of Wickham Market, and with Marshall, Sons & Co., of Gainsborough. From 1894 to 1898 he was out-works engi-



[*Elliott & Fry*

The late Mr. A. W. Blake

neer to Ransomes, Sims & Jefferies, and other appointments held by him have been in Uganda Protectorate, where he was in charge of mechanical transport from 1898 to 1900; borough electrical engineer at Monmouth from 1900 to 1906; and from 1906 to 1912 as advisory and consulting engineer at Swansea. Early in 1912 Mr. Blake was appointed chief electrical engineer to the Willesden U.D. Council, when there were 3,000 consumers, 3,000 kW maximum demand, and 3,000,000 kWh sold per annum. The figures today are 35,000 consumers; 22,000 kW, and 51,000,000 kWh per annum. Mr. Blake was responsible for the erection of the first electrical supply to Ayr, and he also set going the electric plant for printing the *Glasgow Herald*. This was before there w a public electric supply in Glasgow, and the plant which Blake erected did its work for many years. He was a engaged on the erection and operating of the electrical plant the Waterloo & City Railway, and the extension of the City South London line. Mr. Blake was then sent by the Cro Agents for the Colonies to East Africa to assist in the c struction of the Uganda Railway. At a later date he had good deal of experience in the electrification of mines in Sou Wales, and he was responsible for the installation of the fi 3,000-V 3-phase supply there. He had a considerable kno ledge of electric vehicles, particularly as applied to house-refu collection, and Willesden possesses such a service of vehicl Mr. Blake was past-president of the London Section of t Municipal Electrical Engineers, and for the past three ye had been on the Committee of the I.M.E.A. He had serv on many I.E.E., B.E.S.A., and I.M.E.A. special committe and a few weeks ago he went as a representative of the Elect Vehicle Committee of Great Britain to the Conference of Pub Cleansing Engineers. Mr. Blake was a member of t original Electric Vehicle Committee. He was further pr dent of the local branch of the National Association of L Government Officers. For many years he had also been active member of the Batti Wallahs. He was a wid travelled man, both in Europe, Canada, and America. T church service was held at St. Michael's Church, Cricklewo on Wednesday last, and afterwards at the Crematori Golders Green.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companie Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

International Combustion, Ltd.—Public company. Registered July 20th with a nominal capital of £501,698 in 150,000 6 per cent. cumulative preference and 351,698 ordinary shares of £1 each. Objects: To acquire the undertakings and all or any of the property, assets, rights and powers and to undertake all or any of the debts, liabilities and duties of International Combustion, Ltd., the Underfeed Stoker Co., Ltd., Combustion Steam Generator, Ltd., Mining and Industrial Equipment, Ltd., Combustion Engineering, Ltd., and the Detrick Arch, Ltd., pursuant to a scheme of arrangement sanctioned by the Court on July 2nd, 1934, and to carry on the business of designers, manufacturers and builders of and constructional engineers for power plants of all kinds, including the equipment and maintenance thereof; mechanical, consulting, civil, constructional, agricultural and general engineers, gas, petrol, electrical, light and power and hydraulic engineers, &c. The directors are: G. R. T. Taylor, Allerton Hill, Windlesham, Surrey; B. H. Binder, Stoke Lodge, Hyde Park Gate, S.W.7; N. H. Docker, Wootton Courtney, Taunton; L. William Farrow, Elmwood, Kenley, Surrey; F. Hodges, 14, Ashley Gardens, S.W.1; Lt.-Col. Sir Wyndham Portal Raymond, Bt., Laverstoke House, Whitchurch; and G. C. Usher, Abbotts Grange, Hemel Hempstead, Herts. So long as Barclays Nominees (Lombard Street), Ltd., hold not less than 90 per cent. of the ordinary shares they may appoint one director. The directors' borrowing powers are restricted to 50 per cent. of the nominal amount of the issued share capital. No qualification required for first directors; qualification of other directors: 100 shares. Remuneration: £250 each per annum (chairman, £400). Solicitors: Maxwell Batley & Co., 44/6, Leadenhall Street, E.C.3.

London Electronics (Machinery), Ltd.—Private company. Registered July 21st. Capital, £35,000 in 7,000 6 per cent. preference (cumulative as from end of first financial year) and 28,000 ordinary shares of £1 each. Objects: To acquire and develop certain inventions of James Dorn as applied to form cutting machinery, to carry on the business of steelmakers, ironmasters, iron and brass founders, iron workers, blast-furnace proprietors, mechanical, motor and electrical engineers, manufacturers and repairers of dynamos, motors, armatures, magnetos, batteries and electrical plant, manufacturers of and dealers in forgings, castings, and pressings, &c. The directors are C. E. Duits, 55, The Avenue, Brondesbury, N.W.6, and five others. Secretary: G. Bussell, A.S.A.A. Registered office: 20, Bedford Row, W.C.1.

Higgins & Cattle, Ltd.—Private company. Registered July 19th. Capital, £5,000 in £1 shares. Objects: To carry on the business of electrical and general engineers and contractors, &c. The permanent directors are: A. Higgins (managing director and chairman), The Manor House, West Bergholt, Essex; and P. S. Cattle, Brandwood, 38, Sheepcote Road, Harrow, Middlesex. Registered office: 20, Orchard Street, Portman Square, W.1.

W. J. Marchant (Electrical Engineers), Ltd.—Private company. Registered July 21st. Capital, £250 in £1 shares. Objects: To carry on the business of manufacturers, repairers and retailers of dynamos, motors, armatures, magnetos, batteries, conductors, insulators, transformers, convertors, switchboards, stoves, cookers and electrical plant generally, &c. The first directors are: W. J. Marchant, St. Osyths, Wilman Road, Tunbridge Wells: and Maryon Winifred Marchant, St. Osyths, Wilman Road, Tunbridge Wells. Registered office: 2, Mount Sion, Tunbridge Wells, Kent.

Excelda (Appliances), Ltd.—Private company. Registered July 19th. Capital, £500 in £1 shares. Objects: To enter into an agreement with H. H. Williams, Ltd., and Herbert E. Poole at 79, Queen Victoria Street, E.C., for the purchase of the business of manufacturers of and dealers in electric soldering irons, heating pads and other electrical sundries, carried on as "Excelda," by H. H. Williams, Ltd. The subscribers are E. G. Kellond, 3, New College Parade, Finchley Road, N.W.3, and another. Solicitors: Callingham, Ormerod & Maddox, 1, Square, Lincoln's Inn, W.C.2.

C. A. Darby & Sons, Ltd.—Private company. Registe July 16th. Capital, £1,000 in £1 shares. Objects: To carry the business of electrical and general engineers, motor e neers, &c. The first directors are: G. A. Darby, 53, Freder Street, Birmingham, and two others.

Milnes Distributors (South Eastern), Ltd.—Private compa Registered July 16th. Capital, £500 in £1 shares. Objects: carry on the business of wholesale and retail dealers in agents for radio apparatus, gramophones, &c. The f directors are: A. H. Silcocks, 43, Mawneys Road, Romford, two others. Registered office: 56, High Street, Romford, Ess

Arvin Electric, Ltd.—Private company. Registered July 1 Capital, £100 in £1 shares. Objects: To carry on the busin of manufacturers, repairers of and dealers in electrical mechanical apparatus and accessories, and in particular ra sets and apparatus. The first directors are: Mrs. S. Lipm and C. N. Lipman, both of 14, Shirehall Gardens, Brent, N Registered office: 313, Goswell Road, E.C.1.

Returns of Electrical Compani

Telephone & Associated Services, Ltd.—Capital, £15,000 in shares. Return dated March 28th, 1934. All shares taken £3,000 paid. £12,000 considered as paid. Mortgages charges, nil.

Langs (Wimbledon), Ltd.—Capital, £4,000 in £1 sh Return dated March 13th, 1934. All shares taken up. £ paid. Mortgages and charges, £500.

Newey & Eyre, Ltd.—Capital, £4,000 in £1 shares. Re dated February 3rd (filed June 27th), 1934. 1,002 shares t up. £1,002 paid. Mortgages and charges, £2,095 debentures

Maintenance Contracts, Ltd.—Capital, £3,000 in 1,000 5 cent. cumulative preference and 2,000 ordinary shares of Return dated April 11th, 1934. Two shares taken up. £2 p Mortgages and charges, £1,000. A return of allotments up to June 15th, 1934, shows a further 1,000 preference sh allotted for cash and 1,498 ordinary shares allotted as f paid.

W. H. A. Robertson & Co., Ltd.—Capital, £36,000 in 3,000 ference and 600 ordinary shares of £10 each. Return d April 12th, 1934. 2,180 preference and 600 ordinary shares t up. £25,650 paid (£10 on 1,750 preference and 600 ordinary £5 on 430 preference). Mortgages and charges, nil.

Ero Condenser Co., Ltd.—Capital, £200 in £1 shares. Re dated May 15th, 1934. All shares taken up. £200 paid. M gages and charges, nil.

Neon Installations, Ltd.—Fdk. H. Hart, of 14, Dover St W.1, was appointed receiver and manager on July 12th, under powers contained in debenture dated June 8th, 193

London and Provincial Neon, Ltd.—Henry J. R. Roffe Bush House, Aldwych, W.C.2, was appointed receiver on 12th, 1934, under powers contained in debentures dated J ary 10th, 1934.

North Somerset Electric Supply Co., Ltd.—Satisfactio full on June 30th, 1934, of first mortgage debenture d October 30th, 1922, for £25,000, debenture dated February 1925, for £15,000, collateral mortgage dated February 15th, and debenture dated September 27th, 1926, for £30,000, registered November 1st, 1922. February 24th, 1925, July 1925, and October 2nd, 1926, respectively.

Leach Electrical and Engineering Co., Ltd.—The nominal capital has been increased by the addition of £500 in £1 ordinary shares beyond the registered capital of £1,000.

Chatterton & Keen, Ltd.—P. V. Chatterton, 94/98, Petty France, Westminster, S.W.1, was appointed receiver and manager on July 11th, 1934, under powers contained in debentures dated March 31st and December 1st, 1933.

West of England Electric Investments, Ltd.—A debenture dated July 6th, 1934, to secure £150,000 charged on the company's undertaking and property, present and future, including uncalled capital, has been registered. The debenture ranks *pari passu* with a debenture dated March 30th, 1932. Holders: Midland Bank Executor and Trustee Co., Ltd., and J. L. Walsh, 7, Parliament Street, S.W.1.

W. Burns & Co., Ltd.—Satisfaction in full on July 4th, 1934, of debenture dated March 23rd, 1934, and registered March 5th, 1934. (According to the register of mortgages, the debenture registered March 26th, 1934, originally secured all sums not exceeding £500 which the chargee might be called upon to pay under a guarantee.)

Debenture dated July 4th, 1934, to secure all moneys due exceeding £1,500 which the chargee may be called upon to pay to Lloyds Bank, Ltd., under a guarantee. Property charged: the company's undertaking and property, present and future, including uncalled capital. Holder: W. J. MacLeod, 81, Holland Park Avenue, W.11.

Block Batteries, Ltd.—Particulars filed of debentures not exceeding £10,000 authorised May 28th, 1934, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £10,000.

Brighton & Preston Relay Station, Ltd.—The nominal capital has been increased by the addition of £2,000 beyond the registered capital of £3,000. The additional capital is divided into 1,000 redeemable "A" preference shares of £1 each.

Allbright Electric Co., Ltd.—Capital, £1,000 in £1 shares. Return dated February 23rd (filed March 14th), 1934. All shares taken up. £1,000 paid. Mortgages and charges, nil.

E. Godfrey (Radio), Ltd.—Capital, £3,000 in £1 shares. Return dated March 6th, 1934. 1,878 shares taken up. £1,828 paid. £150 calls unpaid. Mortgages and charges, nil.

How-Rea Electrical Co., Ltd.—Capital, £200 in £1 shares. Return dated March 19th, 1933 (filed March 21st, 1934). 200 shares taken up. £200 considered as paid. Mortgages and charges, nil.

United Telephone Cables, Ltd.—Capital, £1,000 in £1 shares. Return dated April 5th, 1934. All shares taken up. £1,000 paid. Mortgages and charges, nil.

Electric Supply Corporation, Ltd.—Capital, £750,000 in 331,740 ordinary, 250,000 preference, and 168,260 unissued shares, all of £1. Return dated May 14th, 1934. All the ordinary and preference shares taken up. £529,000 paid on 279,000 ordinary and 250,000 preference shares. £52,740 considered as paid on 52,740 ordinary shares. Mortgages and charges, nil.

M. Partridge & Co., Ltd.—Capital, £5,000 in 2,000 preference and 3,000 ordinary shares of £1. Return dated April 2nd, 1934. 2,005 preference and 3,000 ordinary shares taken up. £2,505 paid. £2,300 considered as paid. Mortgages and charges, nil.

British Glowlamp Works, Ltd.—The nominal capital has been increased by the addition of £3,000 beyond the registered capital of £2,100. The additional capital is divided into 3,000 7 per cent. "A" preference shares of £1 each.

China & Japan Telephone and Electric Co., Ltd.—The nominal capital has been increased by the addition of £125,000 in £1 ordinary shares beyond the registered capital of £75,000.

Stanley Cox, Ltd.—The nominal capital has been increased by the addition of £800 beyond the registered capital of £2,200. The additional capital is divided into 100 cumulative preference and 700 ordinary shares of £1 each.

Electric Light Wood Fittings Co., Ltd.—Debenture, dated June 21st, 1934, to secure all moneys as the chargee (Lt.-Col. A. M. Bruce, 2/5th Royal Gurkhas, Razmak, Waziristan), shall pay to the Midland Bank, Ltd., by reason of a guarantee given by him. Property charged: The company's undertaking and property, present and future, including uncalled capital.

Dicks Wireless & Electrical Factors, Ltd.—Two notices of the appointment of H. B. Sacks, 62/3, Fenchurch Street, E.C.3, as receiver and manager on July 6th, 1934, under powers contained in (a) debentures dated April 5th and 17th, 1934, and (b) debenture dated April 26th, 1934.

Lea, Son & Co., Ltd.—S. Kent, Old Bank Buildings, Bellstone, Shrewsbury, ceased to act as receiver and manager on June 7th, 1934.

City Notes

The Anglo-Argentine Tramways Co., Ltd.—Presiding at the annual meeting on July 24th Mr. B. H. Binder referred to the wasteful and chaotic transport competition in Buenos Aires which was intensified during 1933, and had affected the receipts of the company. A way out of the *impasse* was co-ordination of the transport interests and a complete revision of the terms under which they and the other tramways were compelled to operate. A scheme to this end had been examined and reported upon by the Special Commission appointed by the Intendente and the matter was now in the hands of the National Congress.

The Bagdad Light & Power Co., Ltd.—Presiding at the annual meeting on July 18th Sir William G. Max Muller (chairman) said the new power house plant was only brought into operation at the end of April, and for the first four months of the year they were working with the old and uneconomic plant. The boycott on the part of a certain section of their consumers had an adverse effect on their receipts during the last two months of the year. The immediate object of the boycott was to force the company to supply electricity at lower and unremunerative rates, but political considerations also came into play. The boycott had been overcome. In view of these adverse factors the results for the year under review were satisfactory. At the request of the Iraq Government the maximum rate charged for electricity had been reduced in January from 6.72d. to 6.24d. per kWh. Combined rates had been devised to supply on favourable terms the requirements of large consumers who used electricity outside the peak hours, and some progress had already been made in this direction. Regarding the current year, despite the boycott which continued to exercise an adverse effect on their receipts during the early months, the net profits had reached the same figure as at the corresponding period of last year.

The Jerusalem Electric & Public Service Corporation reports a profit for the year ended March 31st last of £P.27,473, as compared with £P.22,511 in the preceding year. The ordinary dividend is 3 per cent. (against 2 per cent.), and £P.3,557 is carried forward. The report states that the increase in the number of consumers continues to be satisfactory. Further extensions of generating plant and of the transmission system are in hand. During the year 8,000 preference shares and 17,000 ordinary shares were issued, and the proceeds were applied in providing funds for the development of the business.

Electro Trust, Ltd., reports a net revenue for the year ended June 30th of £13,148, as against £13,883 for 1932-33. The dividend on the ordinary stock is maintained at 4 per cent. and £10,724 is carried forward. It is proposed to increase the capital from £300,000 to £600,000. The 300,000 new shares, when fully paid, will be converted into 5 per cent. preference stock and ordinary stock in the proportion of £6 of preference stock to £4 of ordinary stock.

The Great Northern Telegraph Co.'s Holding Co. (Ltd.). reports that the revenue derived from dividends on the 50,000 shares in the Great Northern Telegraph Co., Ltd., amounted to kr. 2,240,000, an increase of kr. 106,250. Accrued interest totalled kr. 50,354, as against kr. 44,316 in the previous year. It is proposed to pay a dividend of 23½ per cent. (against 22 per cent.), and to carry forward kr. 16,329.

Companies to be Struck off the Register.—The names of the following companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary:—A. F. M. Electrical Service, Ltd.; Jesmond Electrical & General Engineering Co., Ltd.; Lewisham and District Electric Supply Co., Ltd.

Falk, Stadelmann & Co., Ltd., report a net profit for 1933-34 of £96,502, as against £78,383 in the preceding year. It is proposed to pay an ordinary dividend for the year of 7½ per cent. (against 5 per cent.), to place £10,000 to reserve (against £5,000), and £5,000 to the staff fund (£2,500), the amount carried forward being £15,168.

Herbert Morris, Ltd., announce that the proposed reduction of the preference capital has received the sanction of the Court. The 20,000 6 per cent. preference shares of £5 each will be repaid, with a full half-year's dividend, on July 31st.

Vickers, Ltd., has declared interim dividends of 2½ per cent., less tax, on the preferred stock and 5 per cent. preference shares and 2½ per cent., tax free, on the cumulative preference shares.

The London Electric Supply Corporation, Ltd., has announced an interim ordinary dividend at the rate of 6 per cent. per annum.

The North Metropolitan Electric Power Supply Co. has declared an interim dividend of 4 per cent. on the ordinary stock.

The Shawinigan Water & Power Co. has announced a quarterly dividend of 13 cents on the common shares (same).

Mather & Platt, Ltd., have declared an interim dividend of 2½ per cent. on the ordinary stock (same).

The Metropolitan Electric Supply Co. has declared an interim dividend of 3 per cent. (same).

Stocks and Shares

TUESDAY EVENING.

IN various parts of the Stock Exchange, a fair amount of business is being done. In other markets there is next to nothing going on. In other words, public interest is spasmodic, the principal attention being turned, at the moment, to shares in gold-mining companies. It is thought that this opening up of fresh areas in auriferous districts is likely to prove, indirectly, of considerable value to companies concerned with the manufacture and supply of machinery and gear of all kinds. It may be noticed that Babcock & Wilcox are advancing in price, on talk of a possible increase in the dividend. That the company has been doing better for some time past is general knowledge. The improvement is generally understood to be connected with the revival of trade at home.

Investment Appetite

London Passenger Transport "C" stock has receded to 80½ after its recent recovery. The other stocks of the Public Boards, Central Electricity, London & Home Counties, &c., hold their last week's advances. The appetite for gilt-edged securities is keen-set. Any new issue that offers what now-a-days is regarded as being a reasonable rate of interest, and which is protected by sound security, can count upon ready support from the investor.

British Electric Traction deferred is 50 points higher, at 645. The buyers are attracted by the progress that is being made in the companies associated with the B.E.T.

Cables and Wireless

Cables & Wireless ordinary stocks are both lower, but the preference remains steady at 69½. The attention drawn to

the relative cheapness of Great Northern Telegraphs has had the effect of bringing in investment orders, which served to counteract the previous heaviness of the market, and to lift the price 10s. to 36. At the latter figure, the yield on the money comes to over 5½ per cent., and, in view of the security which the shares offer by reason of the extremely strong financial position of the company, this is a good return. The shares, moreover, are in certificates to bearer; there is, accordingly, no heavy stamp duty for the buyer to pay. The annual report of the Great Northern Telegraph Company's Holding Company came out this week. Earnings are derived from the dividends on 50,000 shares in the Great Northern Telegraph Company, and the directors have raised the dividend from 22 per cent. to 23½ per cent. The £3 shares are quoted in Copenhagen at about 11. The dividend on Great Northern Telegraph shares has been for some time past 20 per cent. American Telephone & Telegraphs eased off to 112½; International to 11. Western Union stock is lower at 37½.

Home Electricity Supply Shares

Movements in the prices of shares in the Home Electricity Supply group are so small that they have produced hardly a change in the list of official quotations. Actually, Electric Supply Corporation shares and Yorkshires are a shade easier, but the variation is no more than 3d. in each case, and, as just mentioned, this is too slight for it to be reflected in the officially quoted prices. Metropolitans are ex dividend, and the price is left at 52s. 6d., which means recovery of the amount deducted. Notting Hill preference at 14¼ are 5s. down.

There are on offer in the market at the moment 1,000 of the ordinary shares in the Brompton & Kensington, the Westminster and the Chelsea companies, at 34s. 3d., affording returns in each case of £4 1s. 9d. per cent., on the basis of the 7 per cent. standard dividend paid by the companies. For a similar number of South London Electric ordinary, 35s. 6d. is asked, and for 500 St. James's ordinary, 36s., the yields in these two latter cases being £3 18s. 9d. and £4 3s. 3d. xd. per cent. Of Charing Cross Electric ordinary shares, 2,500 are obtainable at 34s. 6d., paying £4 1s. per cent. on the money. These yields, it is necessary to repeat, are calculated upon the 7 per cent. standard rate of dividend, a rate which it is, of course, hoped may be increased in respect of the present twelve months. St. James & Pall Mall paid 7½ per cent. last year.

Provincial Electricity Shares.

In the list of provincial shares, 2,500 Newcastle & District Electric Lighting ordinary can be bought at 35s. 6d., to pay £3 18s. 9d. per cent., and 2,500 North Eastern Electric ordinary at 33s. 9d., yielding £3 11s. per cent. The Newcastle & District is paying 7 per cent. dividends, and the North Eastern 6 per cent. on their ordinary shares. Northampton Electric Light & Power ordinary can be bought at 54s., as to 1,000 or so, and return £3 14s. per cent. For a line of shares, mention may be made of 5,000 Yorkshire Electric Power ordinary at 46s. 9d. ex dividend, this giving £3 8s. 3d. per cent. The company is paying 8 per cent. at present. Southern Area Electrics have come into a little demand up to 23s. 6d., at which the income is £3 8s. per cent., taking 4 per cent. as the probable dividend. For tax-free shares, 1,000 Hendon Electric ordinary can be cited as available at 55s. 9d., at which the yield is £2 13s. 9d. per cent. free of tax, and a second example is that of the Madras Electric Supply Corporation, where 2,000 ordinary shares are on offer in the market at 40s. 6d., giving at that price £3 19s. per cent. tax free.

Dollar Stocks

The collapse of the recent big strike in San Francisco has done nothing to assist the prices of American and Canadian Industrial companies. Temporary rises occurred, in some of the American Stock Exchanges, amongst a few Industrial issues, but this improvement did not last, and the tendency in dollar stocks is towards lower levels. On this side of the Atlantic, the interest in such stocks and shares has dwindled to a minimum. Prices go up and down, it is true, in correspondence with the quotations cabled from America, but speculation in the leading counters has fallen away in somewhat remarkable fashion. Brazilian Tractions, one of the liveliest counters in the list, are exceedingly quiet at the present time. The price is 8¼, after being nearly 9. Montreal Light & Power at 34 is 1½ lower. Shawinigan Water & Power shares at 20½ are ½ down, in spite of the record power output reported by the company for the first six months of the present year. Power Corporations fell to 10¼. Canadian General Electric stock at 59 is 2 points up.

Manufacturing and Equipment

Aron Meter shares, which went up briskly to 55s. last week, have reacted a few pence to 54s. 6d. This section as a whole is quiet and somewhat neglected. Edison Swan first preference at 21s. 3d. are ⅛ lower. Callenders, Henleys, British Insulated and General Electrics maintain their previous prices. International Automatic Telephones at 35s. have gone back ⅛. Telephone & General Trust ordinary shares remain steady at 29s. 6d. Enfield Rolling Mills are a better market at 30s. 3d. After minor fluctuations, Electric & Musical Industries firmed up to 26s. 3d. Radio Corporations gave way from 5, to 4¾. Hopes of an increased dividend lifted Babcock & Wilcox 3s., to 43s. The rubber share market is steady, without attracting particular notice.

Share List of Electrical Companies

	Nom.	Dividend. 1932.	Dividend. 1933.	Price. July 24.	Rise or Fall.	Yield. p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	77/6	—	3 17 2
Brompton Ordinary	1	7	7	34/–	—	4 2 4
Charing Cross Ordinary	1	7	7	34/–	—	4 2 4
Chelsea	1	7	7	34/–	—	4 2 4
City of London	1	7½	7½	35/–	—	4 5 9
Clyde Valley	1	7	7	40/–	—	3 10 0
County of London	1	10½	10½	57/6	—	3 13 1
Edmundson's 7% Pref.	1	7	7	34/–	—	4 2 4
Elec. Dis. Yorkshire	1	9	9	47/–	—	3 16 6
Elec. Supply Corporation	1	11	11	59/6	—	3 13 10
Kensington Ordinary	1	7	7	34/–	—	4 2 4
Lancs Light and Power	1	7	7½	37/6	—	4 0 0
London Electric	1	7	7	34/6	—	4 1 2
Metropolitan	1	10	10	52/6xd	+6d.	3 16 2
Midland Counties	1	7	7	37/6	—	3 14 8
Mid. Elec. Power	1	8	8	43/9	—	3 13 2
North Eastern Electric Ordinary	1	6	6	33/–	—	3 12 10
Do. 7% Pref.	1	7	7	35/–	—	4 0 0
Northampton	1	10	10	53/9	—	3 14 4
Notting Hill 6% Pref.	10	6	6	14¼	–¼	4 4 4
North Met. Elec. Ordinary	1	10	10	62/6	—	3 4 0
Do. do. 6% Pref.	1	6	6	31/–	—	3 17 5
St. James' and Pall Mall	1	7	7½	35/–	—	4 5 9
Scottish Power	1	8	8	40/–	—	4 0 0
South London	1	7	7	36/–	—	3 17 9
Westminster Ordinary	1	7	7	34/–	—	4 2 4
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/–	—	7 2 10
Yorkshire Elec.	1	8	8	47/–	—	3 8 1
PUBLIC BOARDS.						
Central Electricity, 1950–70	Stock	5	5	117	—	4 5 6
Do. 1955–75	,,	5	5	118	—	4 4 9
Do. 1951–73	,,	4½	4½	109	—	4 2 7
Do. 1963–93	,,	—	3½	101	—	3 9 4
London & Home Counties, 1955–75	,,	4½	4½	108xd	—	4 3 6
London Passenger Transport, A	,,	—	4½	117	—	3 17 0
Do. do. B	,,	—	5	121	—	4 2 8
Do. do. C	,,	—	—	80½	–1	—
West Midlands Joint Elec. 1948–68	,,	—	5	114	—	4 7 9
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	112½	–1	8 0 0
Anglo-Am. Tel. Pref.	Stock	6	6	112xd	—	5 7 2
Do. Def.	,,	1½	1½	27½	—	5 9 1
Cables & Wireless 5½% Pref.	,,	2¾	2¾	69½	—	3 19 2
Do. A. 7½% Ord.	,,	Nil	Nil	14	–1	—
Do. B. Ord.	,,	Nil	Nil	6½	–¾	—
Globe Tel. and T. Ord.	10	Nil	2½	9½	—	2 12 6
Do. do. Pref.	10	6	6	12¾	—	4 18 0
Great Northern Tel.	10	20	20	36	+½	5 11 1
Marconi-Marine	1	10	7½	29/6	—	5 1 8
Oriental Telephone Ord.	1	12	12	3½	—	*3 16 10
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	1/6	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	4½	—	—
British Electric Traction Df. Ord.	,,	5	5	645	+50	—
Do. do. Pref. Ord.	,,	8	8	157½	—	5 1 7
Brazil Traction	100	—	—	8½	–¼	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	105xd	—	4 15 3
Mexico Trams, 5% Bonds	—	5	5	24½	—	20 8 0
Mexican Light Common	100	Nil	Nil	3½	—	—
Do. 7% Pref.	100	7	7	7½	—	—
Do. 1st Bonds	—	5	5	49½	—	10 10 6
Victoria Falls Ord.	1	15	20	6½	—	3 5 4
Yorkshire (West Riding)	1	2½	5	25/9	—	3 17 8
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	4	3	18/6	—	3 4 10
Do. Pref.	1	8	8	32/–	—	5 0 0
Babcock & Wilcox	1	9	6	43/–	+3/–	2 15 9
British Aluminium Ord.	1	5	5	28/3	—	3 11 0
British Insulated Ord.	1	15	15	70/–	—	4 5 9
Brush Ord.	Stock	Nil	Nil	33	—	—
Callender's	1	15	15	3⅞	—	4 14 1
Do. 6½% Pref.	1	6½	6½	31/3	—	4 3 2
Crompton Parkinson Ord.	5/–	22½	12½	25/6	—	4 18 4
Do. 8% Pref.	1	8	8	32/6	—	4 18 6
Edison-Swan 1st Pref.	1	7½	7½	21/3	–⅛	7 1 2
Do. 5% Deb.	Stock	5	5	107½	—	4 13 0
Electric Construction	1	Nil	Nil	11/3	—	—
Enfield Cable Ord.	1	25	20	86/3	—	4 13 0
English Electric	1	Nil	Nil	5/9	—	—
Do. do. Pref.	1	Nil	Nil	9/6	—	—
Ever Ready	5/–	35	35	29/–	—	6 0 8
Ferranti Pref.	1	7	7	26/6	–6d.	5 5 8
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	8	8	45/9	—	3 9 10
Henley's	1	30	30	6½	—	4 17 8
Do. 4½% Pref.	5	4½	4½	5½	—	4 1 9
India-Rubber Preferred	1	—	—	18/9	—	—
Johnson & Phillips	1	5	5	22/6	—	4 9 0
Siemens Ord.	1	6½	4	17/6	—	4 11 6
Telegraph Construction	£1	Nil	Nil	1	—	—

*Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parenthesis are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1932

26720. "Coupling of alternating-current networks by mercury-vapour converters." Akt.-Ges. Brown, Boveri et Cie. September 25th, 1931. (412571.)

26768. "Electrical ceiling or pull switches." J. A. Crabtree (A. E. Gerard and W. G. Gerard). September 27th, 1932. (412595.)

27214. "Electric converting apparatus." British Thomson-Houston Co., Ltd. October 1st, 1931. (412597.)

36006. "Electric switches such as those controlling electric motors." British Thomson-Houston Co., Ltd., and W. L. Wise. December 19th, 1932. (412574.)

36197. "Loud-speakers." E. R. Dempster and Magnavox (Great Britain), Ltd. December 21st, 1932. (Cognate application 6905/33.) (412552.)

36384. "Electrically-operated road-traffic control systems." H. Baron and A. S. Fitzgerald. December 23rd, 1932. (412560.)

36596. "Method and apparatus for the electrodeposition of metal." W. J. Tennant (Copperweld Steel Co.). December 24th, 1932. (412577.)

36810. "Automatic and semi-automatic telephone systems." Telefonaktiebolaget L. M. Ericsson. December 29th, 1931. (412590.)

36811. "Automatic telephone systems." Telefonaktiebolaget L. M. Ericsson. December 29th, 1931. (412591.)

36813. "Circuit arrangements for transmitting impulses in telephone systems." Telefonaktiebolaget L. M. Ericsson. December 29th, 1931. (412592.)

36841. "Automatic circuit-breakers." J. A. Crabtree. December 30th, 1932. (412606.)

36876. "Installations containing pressure media intended to be balanced, and more particularly to pressure electric cable systems." Enfield Cable Works, Ltd., F. W. Main and J. S. Hastie. December 30th, 1932. (412607.)

36925. "Traffic-control signals." Automatic Electric Co., Ltd., and L. M. Simpson. December 30th, 1932. (412608.)

36992. "Telephone and like signalling systems." Electrical Research Products, Inc. December 31st, 1931. (412611.)

37034. "Mercury-arc rectifiers." British Thomson-Houston Co., Ltd., and E. M. Weaver. December 31st, 1932. (412614.)

37047. "Telephone systems." Telefonaktiebolaget L. M. Ericsson. December 31st, 1931. (412616.)

1933

12. "Rotary switch mechanisms, such as are used in automatic telephone systems." Standard Telephones and Cables, Ltd., C. P. Smith and G. Newton. January 2nd, 1933. (Addition to 342736.) (412619.)

13. "Railway or like signalling systems." Standard Telephones and Cables, Ltd., and J. B. Griffiths. January 2nd, 1933. (412620.)

91. "Diaphragms and separator diaphragms for electric accumulators." Compagnie Générale d'Electricité. January 2nd, 1932. (412625.)

712. "Variable inductances." General Electric Co., Ltd., H. C. Turner and G. R. Polgreen. January 9th, 1933. (412642.)

763. "Gas vapour electric discharge devices." Radio Research Laboratories, Inc. May 3rd, 1932. (412643.)

1151. "Thief-proof combination ignition switch for motor vehicles." G. Martin and A. Jones. January 13th, 1933. (412647.)

3878. "Hand-operating mechanism for electric control apparatus." Allen West and Co., Ltd., and W. Taylor. January 30th, 1933. (412663.)

3235. "Light-sensitive devices." British Thomson-Houston Co., Ltd., H. R. Ruff and W. J. Scott. February 2nd, 1933. (412665.)

3395. "Manufacture of cores of magnetic material for electrical inductances or the like." General Electric Co., Ltd., and C. G. Smith. February 3rd, 1933. (412667.)

3551. "Electrical connection devices." British Insulated Cables, Ltd., and J. Rawlinson. February 6th, 1933. (412671.)

3771. "Electrical switches or circuit-breakers." G. E. Whitehead and Whitehead's Electrical Inventions, Ltd. February 7th, 1933. (412673.)

4046. "Electric totalisator systems." J. Handley, C. Suckling and R. H. Suckling. February 9th, 1933. (412675.)

4166. "Thermionic amplifiers." Standard Radio Relay Services, Ltd., and P. Adorjan. February 10th, 1933. (412678.)

4737. "Apparatus for the electroplating of metal objects." J. Kronsbein and C. F. Neale. February 16th, 1933. (412685.)

5334. "Wireless receiving systems." A. C. Cossor, Ltd., and D. F. S. Marshall. February 21st, 1933. (412690.)

5467. "Thermionic valves." Ferranti, Ltd., and M. K. Taylor. February 22nd, 1933. (412693.)

5717. "Electric clocks." International General Electric, Inc. February 24th, 1932. (412696.)

7175. "Electric discharge devices." M-O Valve Co., Ltd., and C. J. Smithells. March 9th, 1933. (412705.)

8025. "Means for supporting electric conductors." Callender's Cable and Construction Co., Ltd., and A. P. Brown. March 16th, 1933. (412712.)

9647. "Electric remote-control systems." Siemens Bros. and Co., Ltd., C. J. B. Douglas and H. E. Humphries. March 22nd, 1933. (Addition to 362485.) (412715.)

9568. "Automatic telephone systems." Siemens Bros. and Co., Ltd., H. E. Humphries and D. P. Long. March 30th, 1933. (412722.)

10075. "Electric current regulating systems." Igranic Electric Co., Ltd (Cutler Hammer, Inc.) April 4th, 1933. (412727.)

10962. "Multiplex telegraph systems." Marconi's Wireless Telegraph Co., Ltd. April 13th, 1932. (412732.)

12430. "Tubular electric incandescent lamps." M. Deghenghi. April 28th, 1933. (Addition to 377394.) (412739.)

13020. "Radio-receiving sets." General Electric Co., Ltd., and C. N. Smyth. May 4th, 1933. (Cognate application 31218/33.) (412743.)

13759. "Electric adding machines." R. E. Boutet. July 8th, 1932. (412747.)

14662. "Electromagnetically-operated vacuum switches." E. Rosumek. May 20th, 1933. (412753.)

14913. "Machines for making stranded cables." Allgemeine Elektricitäts-Ges. May 24th, 1932. (412754.)

15058. "Automatic switch for electric heating apparatus." N. Caillaud. May 24th, 1933. (412755.)

16660. "Radio coupling coils." Oliver Pell Control, Ltd., C. Oliver and G. H. Moody. June 10th, 1933. (412764.)

19319. "Grid-controlled valve apparatus." Allmänna Svenska Elektriska Aktiebolaget. July 9th, 1932. (412773.)

19336. "High-frequency coupling element." Naamlooze Vennootschap Philips' Gloeilampenfabriken. July 27th, 1932. (412774.)

23016. "Method for the electrodeposition of metal." W. J. Tennant. (Copperweld Steel Co.) December 24th, 1932. (Divided application on 412577.) (412582.)

23017. "Method and apparatus for the electrodeposition of metal." W. J. Tennant (Copperweld Steel Co.). December 24th, 1932. (Divided application on 412577.) (412563.)

23879. "Television systems." W. R. Bullimore and L. H. Bedford. August 28th, 1933. (412794.)

24040. "Insulated electric conductors for deep-sea signalling cables." Norddeutsche Seekabel-Werke-Akt-Ges. October 24th, 1932. (412796.)

24089. "Electric fire and temperature alarms." F. G. Bloch. August 30th, 1933. (412797.)

24814. "Thermally-operated electric relays." J. B. Bresson et Cie and S. J. B. Thomas. November 30th, 1932. (412799.)

25234. "Electromagnetic couplings." H. Pfeningbauer. September 13th, 1932. (412800.)

25503. "Alternating-current motor drives." British Thomson-Houston Co., Ltd. September 14th, 1932. (412804.)

27080. "Television apparatus." Marconi's Wireless Telegraph Co., Ltd. September 30th, 1932. (412813.)

28268. "Method and arrangement for the starting-up of telegraph apparatus." Siemens & Halske Akt-Ges. July 11th, 1933. (412816.)

31146. "Spill-over or relaxation oscillation generators and apparatus incorporating the same." Telefunken Ges für Drahtlose Telegraphie. November 8th, 1932. (412833.)

31642. "Method and device for the photographic recording of sound by means of cathode-ray tubes." Friess Akt-Ges für Film und Tongeräte. November 12th, 1932. (412836.)

31872. "Electric discharge tubes." C. H. F. Muller Akt-Ges. December 2nd, 1932. (412837.)

32091. "Container for electric accumulators." Britannia Batteries, Ltd. November 28th, 1932. (412840.)

32136. "Gasfilled incandescent electric lamp with a tubular bulb." Vereinigte Gluhlampen und Electricitäts Akt-Ges. November 18th, 1932. (412841.)

32744. "Electric control systems for alternating-current projection-arcs." A. W. Parfitt (C. Tappan). November 23rd, 1933. (412844.)

33283. "Means for regulating transformers." Akt-Ges. Brown Boveri et Cie. November 28th, 1932. (412846.)

33953. "Induction motors of the squirrel-cage type." Worthington-Simpson, Ltd., and Soc. de Particination Financière Electric Pump. December 2nd, 1933. (412850.)

34772. "Starter and controller for electric motors, more particularly for sewing machines." I. Gonyk. December 11th, 1933. (412856.)

35702. "Friction-operated electrical switches." Igranic Electric Co., Ltd. December 19th, 1932. (412864.)

36092. "Method of, and means for, assembling and mounting a plurality of flat members, particularly applicable to variable electrical condensers." Jackson Bros. (London), Ltd., L. E. Fillmore and L. W. Fillmore. December 22nd, 1933. (412865.)

1934

3141. "Electric discharge tubes." General Electric Co., Ltd. March 10th, 1933. (412879.)

3506. "Pneumatically-operated electric switches." British Thomson-Houston Co., Ltd. February 2nd, 1933. (412882.)

3707. "Process for the manufacture of separators for electric accumulators." Accumulatoren-Fabrik Akt-Ges. February 4th, 1933. (412884.)

5770. "Electric arc welding apparatus." L. Smalley. February 21st, 1934. (412892.)

6712. "Detection of a wireless signal by the use of two high-frequency valves arranged in push-pull (working alternately)." J. Meinesz. March 2nd, 1932. (412895.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from July 18th :—

Deverr. No. 540903. Class 1. Artificial resin for use as an ingredient in manufactures.—Die Vereinigte Chemische Fabriken Kreidl, Heller & Co., Vienna, Austria (British representatives: Marks & Clerk, 57-58, Lincoln's Inn Fields, W.C.2).

MC (lettering and design). No. 547100. Class 6. Electric fans, motors and polishing lathes.—Marelli & Co., Ltd., 19-20, Garlick Hill, Queen Victoria Street, E.C.4.

Graviner. No. 547694. Class 13. Electric switches (ordinary), and parts thereof.—Graviner Manufacturing Co., Ltd., First Avenue House, High Holborn, W.C.1.

Anka. No. 548127. Class 13. Electrical connectors made principally of ordinary metal.—Callenders Cable & Construction Co., Ltd., Hamilton House, Victoria Embankment, E.C.4.

Currys (lettering and design). No. 550005. Class 13. Flash lamps, torches and cycle lamps.—Currys, Ltd., 23-28, Goswell Road, E.C.1.

Stribit. No. 551611. All goods in Class 16.—Robert Bosch Gesellschaft, Stuttgart, Germany (British representatives: Abel & Imray, 30, Southampton Buildings, Chancery Lane, W.C.2).

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aylesbury.—Houses (50), California; borough surveyor.

Bakewell.—Houses (24), Stoney Middleton; G. V. Sayner, architect, 4, Grove Parade, Buxton.

Bathgate.—Houses (20), Cochrane Street; A. L. Reid, burgh surveyor, 32, Hopetoun Street.

Bedford.—Houses (19), Castle Road; H. C. Janes, Ltd.

Birkenhead.—Staff laundry, Church Road Institution; B. Robinson, borough engineer.

Boston.—Houses (112); Steele & Goddard, builders, Grimsby.

Bournemouth.—Houses (30), Broughton Avenue; E. W. Lancaster, architect. Extensions, Stourfield School (£11,777); borough engineer.

Braintree.—Cinema, old Palace Theatre site; Leslie H. Kemp and Tasker, architects, London, W.C.1.

Chatham.—Houses (52); R. L. Honey, borough engineer.

Cheadle (STAFFS).—Houses (100), Werrington, for J. James.

Cowie (STIRLING).—R.C. church for the R.C. authorities; F. Fairlie, Larbert.

Crickhowell.—Houses (36); R.D.C. surveyor.

Croydon.—Houses (28), Norbury Rise; F. H. Willcocks.

Dalbeattie.—Houses (56), Craigmath site; R. Flinn, burgh surveyor.

Darlington.—Houses (22), Saltersgate Road; L. W. Evans, builder, 23, Coniscliffe Road.

Dawley.—Houses (30); J. H. T. Hickman, U.D.C. architect, 1, Market Street, Wellington, Shropshire.

Dorchester.—Isolation hospital; borough engineer.

Dorset.—Extensions, Poor Law Institution, Poole (£15,000); county surveyor, Dorchester. Extensions, Weymouth Grammar School (£8,470), and Dorchester Grammar School (£3,925), for County E.C.; Dunthorne & Co., builders, Glastonbury.

Dumbarton.—Houses (36); A. W. Jeffrey, burgh surveyor, Dhuran, Stirling Road.

Ebbw Vale.—Senior schools, Glyn Coed, for E.C.; director of education.

Eccles.—School, Winton (720 places), for Borough E.C.; Biram & Fletcher, architects.

Edinburgh.—Houses (34), Cramond Bridge, for the Edinburgh Housing Association, Ltd.; A. H. Mottram, architect, 59, Frederick Street.

Essex.—Senior school (360 places), Rochford, for County E.C.; J. Sargent, director of education, Chelmsford.

Exeter.—Aerodrome, Clyst Honiton, and City hall (£273,000) competition; city engineer.

Farnham.—Development of Bridgefield Estate; Farnham Flint, Gravel & Sand Co. Factory, Runfold; Runfold Sand & Tile Co., Ltd.

Fleetwood.—R.C. schools (£6,500), St. Wulstan's managers; Rev. Father McKenna.

Gateshead-on-Tyne.—Cinema, Low Fell; E. M. Lawson, architect, 19, Ridley Place, Newcastle-on-Tyne.

Girvan.—Houses (70); burgh surveyor.

Glasgow.—Buildings to Lennox Castle Hospitals; Wright & Wylie, architects. Reconstruction of the Gaiety Theatre, Argyle Street (£16,000), for Scotts' Theatres, Ltd.; G. Scott, 154, West Regent Street.

Hampshire.—Schools, Cove, and Alton, for County E.C.; director of education, Winchester.

Harpenden.—Houses (36); U.D.C. surveyor.

Hemel Hempstead.—Houses, Lawn Lane; British Paper Co.

Hertfordshire.—Conversion of mansion into public offices (£200,000), for C.C.; clerk, Hertford. Isolation block for Wellhouse Hospital, Barnet, for C.C.; Alfred Saxon, Snell & Phillips, architects. Extensions, Agricultural Institute, Hill End Hospital (£32,750), and Girls' Grammar School, Ware; county surveyor.

Hinckley.—Cinema to replace Borough Theatre; Hurley Robinson, Birmingham.

Holbeach.—Houses (36), Gedney; A. E. Palmer, architect, 1a, Pinchbeck Street, Spalding.

Houghton-le-Spring.—Houses (70); T. M. Morley, R.D.C. surveyor, 18, Church Street.

Hungerford (BERKSHIRE).—Cinema; Miss Moore.

Irish Free State.—(CASTLEBAR, CO. MAYO).—Houses (36); T. P. McDonough, architect, Courthouse.

Kettering.—Houses (48), London Road Estate; City & Borough Housing Corporation, Ltd.

Kingston-on-Thames.—Isolation hospital extensions (£25,000) for the Tolworth Joint Hospital Board; S. C. T. Littlewood, clerk.

Lanarkshire.—Primary school, Carmyle (electrical and heating work), for C.C.; J. Stewart, county architect, 20, Albert Street, Motherwell.

Leeds.—Factory, Cardigan Crescent, for Price (Tailors), Ltd., Kirkstall Road; Philip P. B. Nicolle, staff architect. Unemployment exchange, Eastgate (£40,000), for H.M. Office of Works.

Leicester.—Cinema, Melton Road, for H. D. Moorhouse, Circuit Imperial Buildings, Oxford Road, Manchester; H. A. Yearsley, architect, Imperial Buildings, 7, Oxford Road, Manchester.

Liverpool.—Houses (113), Rudyard Road and Thomas Lane, for the District Estates, Ltd., 19, Castle Street; A. E. Shennan, 17, North John Street.

Llanelly.—Dance hall (£15,000) for the Ritz Co., Ltd.

London.—(BATTERSEA).—Modernisation of Nine Elms Baths (£6,000); borough engineer. (BROCKLEY).—Blocks of flats, Honor Oak Estate (£72,000), for the L.C.C.; Henry Boot & Sons, Ltd. (CATFORD).—Development of Flower House Estate; L. A. Culliford. (DEPTFORD).—Tenements (180), Speedwell Street (£70,000); L.C.C. architect. (EAST HAM).—Maternity hospital and clinic; borough engineer. (HACKNEY).—Tenements (160), Banister Street (£34,000); Higgs & Hill, Ltd. (LAMBETH).—Extensions to County Hall (£550,000); L.C.C. architect. (LEWISHAM).—Development of Morden Hill Estate; H. Boot & Son, Ltd. Library (£14,845) and public baths (£57,027), Downham housing estate; borough surveyor. (S.E.).—Fire brigade quarters, Albert Embankment (£250,000); L.C.C. architect. (SHOREDITCH).—Tenements, Clarissa Street (£11,377); Mattock Bros. (STOKE NEWINGTON).—Flats (74), Glebe Estate (competition); borough engineer. (TOTTENHAM).—Factory and block of offices, Park View Road; House Property & Investment Co. Factory extensions, West Road; Pearlite Box Co., Ltd. Factory extensions, South Grove; Sonneborn & Co., Ltd. (WESTMINSTER).—Flats (96), Grosvenor Estate (£54,200); Gee, Walker & Slater, Ltd. Buildings, 6-7, Arlington Street, and 7-9, Bennett Street; Robert Angell & Curtis, 133, Regent Street, W.1. Modernisation of Caxton Hall (£5,000); city engineer. Rebuilding of Eaton Mews North; Carter & Sloot. Reconstruction of 199-203, Buckingham Palace Road, for the Art Metal Construction Co.; Wallis Gilbert & Partners. Rebuilding of Westminster House, Gt. George Street; E. Fraser Tomlins, 37, Gower Street, W.C.1.

Macclesfield.—Houses (166), Crompton Road, Broughton Street West, &c., West Macclesfield; P. Wright, architect, 27, King Edward Street. School, Ash Grove, for Borough E.C.; H. Q. Farmer, architect, 102, Brock Street.

Maldon (ESSEX).—Cinema, shops and houses, Wantz Road, for E. T. Baker.

Manchester.—Airport, Ringway (£179,295); city engineer. Additions to New Moston Municipal Junior School, New Moston, for E.C.; Benjamin Smith, builder, 60, Chapman Road, Hulme. Interior reconstruction of Broadcasting House, Piccadilly, for the British Broadcasting Corporation; J. & J. Parish, Ltd., building contractors, Burton Road, Withington.

Marton (BLACKPOOL).—Schools (£30,000) for the managers of St. John Vianney R.C. schools; priest-in-charge.

Methil.—Library; E. L. Forsyth, Methil Brae.

Middlesbrough.—Houses (50); borough engineer. Houses (130), J. McCreton, Ltd., builders. Houses (60), J. & F. Buckle, builders.

Middlesex.—Schools, Kingsbury, Pinner, and Stanmore, for County E.C.

Mottingham (KENT).—Houses, first section of the new housing estate (£156,000); L.C.C. architect.

Newton Abbot.—Houses (32), Broadlands Estate; U.D.C. surveyor.

Northallerton.—Houses (44); C. E. Hildyard, U.D.C. surveyor.

Northamptonshire.—Accommodation for Public Assistance Institution (£13,700); C.C.

Oban.—Road bridge, Loch Awe (£50,000); county clerk.

Oxford.—Bazaar stores, Cornmarket Street, for Marks & Spencer, Ltd., London.

Paisley.—Houses (900), Gallowshill Scheme; J. Lee, burgh surveyor, Town Hall. Extension to museum; Keppie & Henderson, architects, Glasgow.

Patcham.—Houses (24), Wilmington Way; Varndean Estates, Ltd.

Peterborough.—Council school, Fulbridge; S. Dobson & Son, Museum Buildings, Priestgate.

Portsmouth.—Business stores, for the Co-operative Society, Ltd. (£250,000); secretary.

Prestwick (AYRSHIRE).—Cinema (£25,000); Alastair MacDonald, architect.

Reading.—Cinema, King's Road; Associated Architects, Walo Guy, Claverley, Wolverhampton. Granby Cinema, for Mrs. Simmons, Sunshine Corner, Beenham; Edgar Simmons, architect.

Rotherham.—Administrative blocks, verandahs, waiting room to the Alma Road Hospital, adjoining Moorgate (£8,000); Vincent Turner, borough surveyor, Town Hall. Extensions to works, Grange Mill Lane, Blackburn, for Ambrose Shardlow & Co., Ltd., Ealing Works, Washford Road, Attercliffe, Sheffield; W. & A. Fosdike, Ltd., builders, St. Mary's Road, Sheffield.

Sheffield.—Houses (40), Springfield Avenue, Millhouses; Frederick Ridal & Son, 8, Cobden View Road, Crookes.

Solihull.—Houses (24); Housing, Ltd., builders, Blackheath.

Staverton.—Factory extensions for Nestlé & Anglo-Swiss Condensed Milk Co. (£20,000); Blackford & Sons, builders, Calne.

Stirling.—Reconstruction of houses, The Haugh, Bannockburn; J. Stevenson.

Stratford-on-Avon.—Municipal buildings (£30,000); borough surveyor.

Surrey.—Laundry, Poor Law Institution, Farnham, for C.C.; Hodgson, Dixon & Quirk. Schools, Banstead (£29,080), for County E.C.; secretary, Kingston-on-Thames.

Tanfield.—Houses (72); J. R. Heslop, U.D.C. surveyor.

Tonbridge.—Houses (25); W. L. Bradley, U.D.C. architect, the Castle.

Twickenham.—School, Whitton (£30,650), for E.C.; director of education.

Walsall.—Houses (300); borough surveyor.

Wellingborough.—Houses (36), Buxton Road district, Macclesfield; J. Wellings & Sons, builders, Derby Street, Macclesfield.

Weston-super-Mare.—Methodist Church, Station Road; Fry, Paterson & Jones, architects.

West Riding.—Schools, Adwick-le-Street (£41,750); Sprotborough (£5,535), for County E.C.; director of education, Wakefield. Infants' School, Newall Carr Road, Otley; Education Officer, County Hall, Wakefield.

Weymouth.—Houses (200); borough surveyor.

Windsor.—Houses (66); E. H. Brewer, builder.

Woking.—Houses (44), Westfield Farm site; U.D.C. surveyor.

Worcestershire.—Reconstruction of Bromsgrove Institution (£15,000); clerk, Worcester.